A Database Publication

THE MICRO USER

Volume 5
Number 9
November 1987
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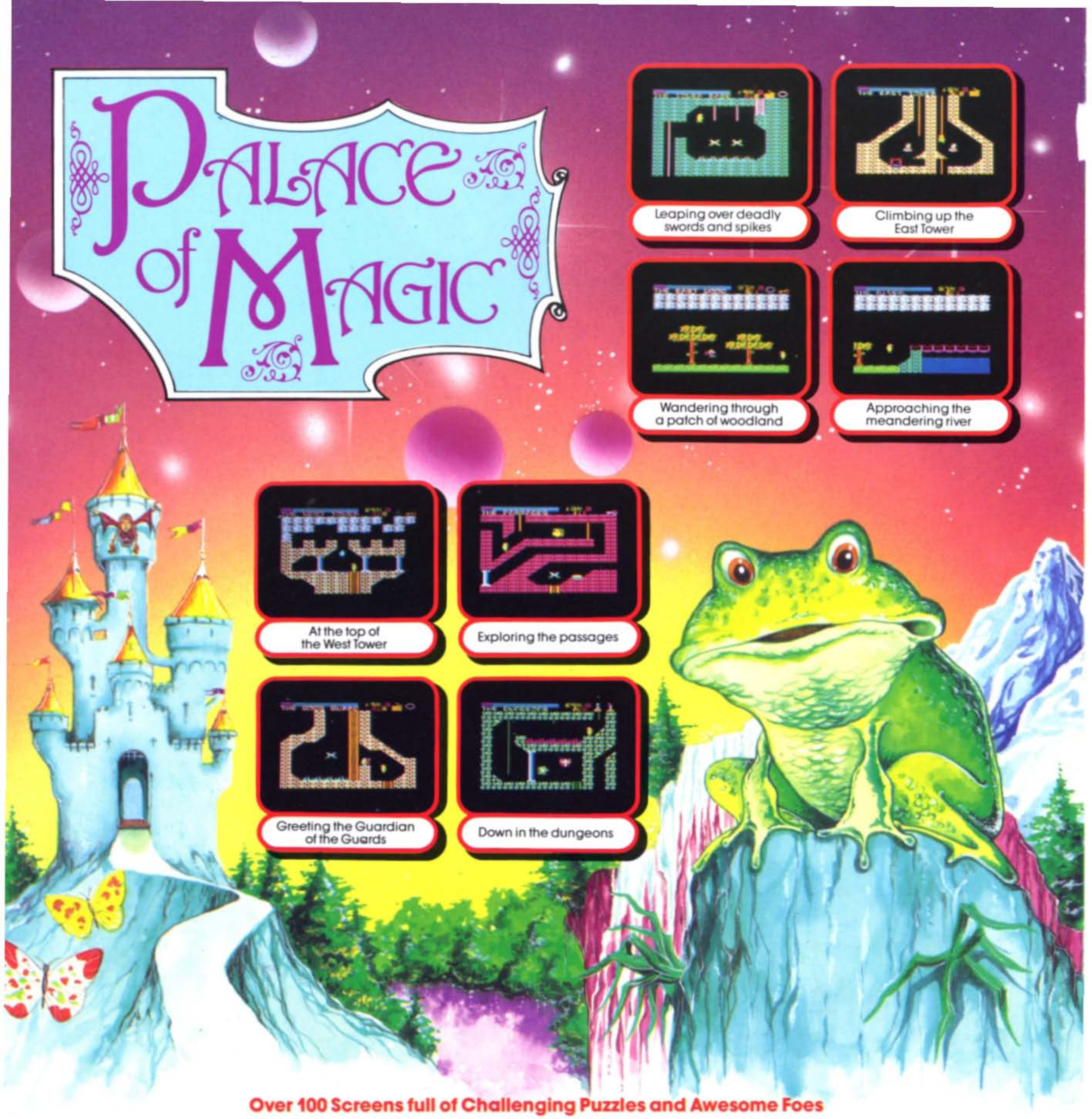
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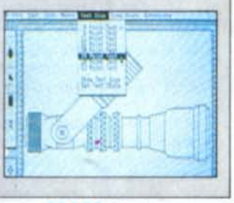

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David Braben tells how he wrote the epic that is creating a revolution in games programming

Vol. 6 No. 9 November 1987

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The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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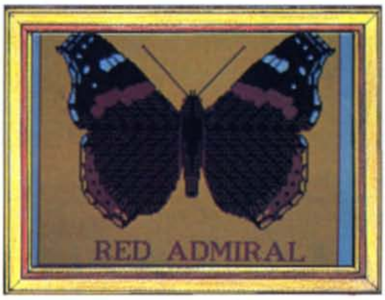

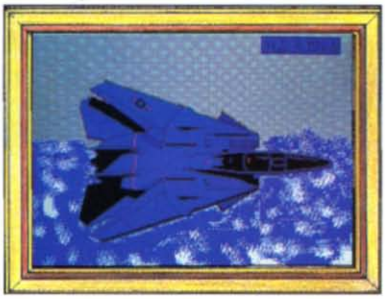

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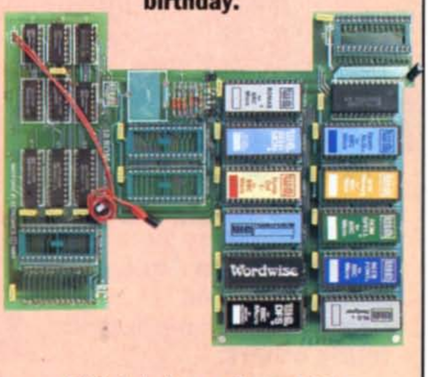
The chance to get your news, views, moans and name into print.

EXCLUSIVE

Zarch – the most exciting game ever released ... on the fastest micro in the world. Now we can reveal the secrets of how the author, David Braben, came to write this stunning game. Plus his vision of the future. See Page 16.

WIN this rom board packed with roms, courtesy of Watford Electronics to celebrate their 15th birthday.



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Save money on bargain offers from fellow readers – Page 140.

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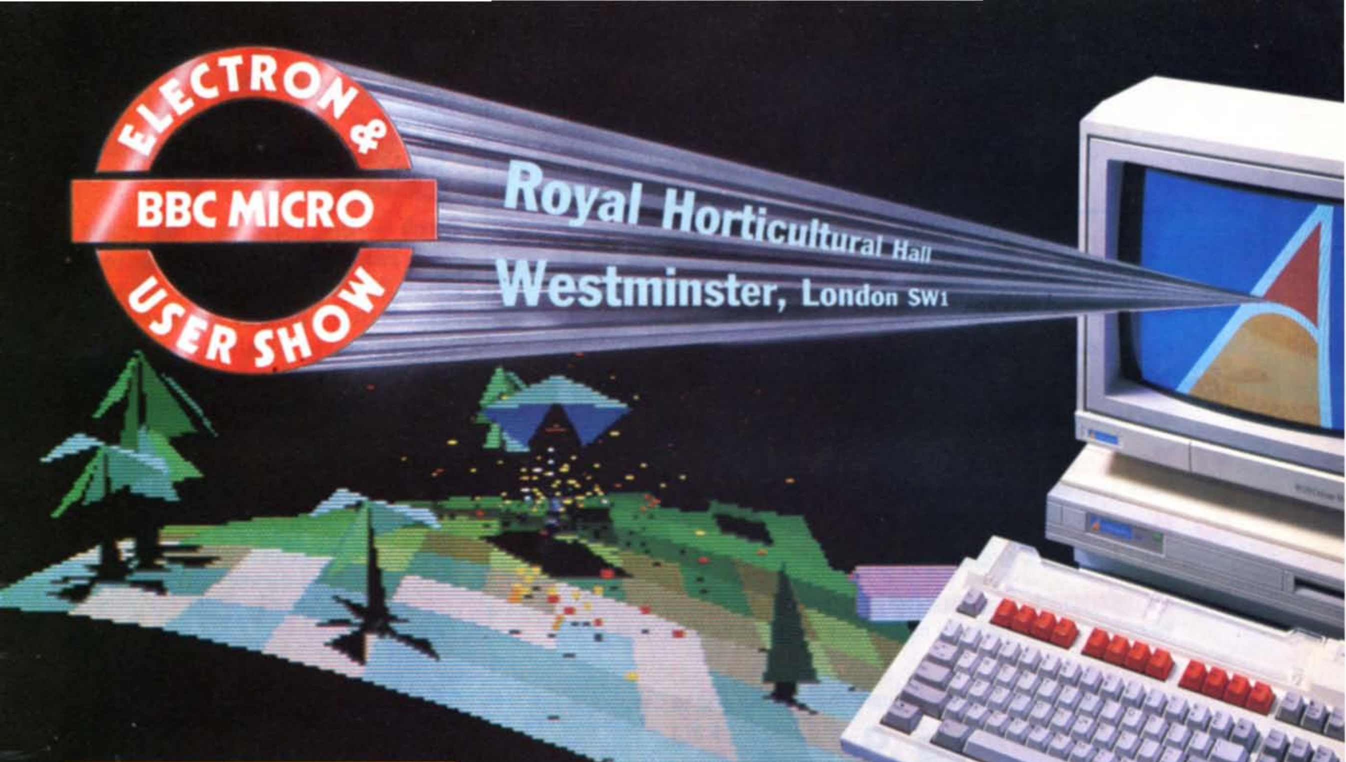
THE MICRO USER

December issue on sale November 4



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THE MICRO USER NEWS

Stitch in time...

SCHOOLS and colleges have been rushing to buy Knitwear Designer, the program that allows users to create stylish sweaters on the BBC Micro.

Teachers have recognised the program's potential value within the home economics syllabus – particularly for the new GCSE examination.

Education establishments from Glasgow to Plymouth began the new school year by familiarising themselves with the software, which costs £8.95 on tape and £9.95 on disc.

Typical of schools using Knitwear Designer is Kitwood Girls School in Boston, Lincs.

Head of home economics Margaret Barsley said: "The program will help our girls design and produce their own garments – drafting individual patterns to their own sizes – and prepare them for the GCSE textiles exam.

"We had one girl doing knitwear designing last year, but that was an individual talent – now we can get all our fourth and fifth year homecraft girls involved in this activity".

Christine Carter, head of the textile department at Thomas Lord Audley School, Colchester, said: "I'm looking forward to fitting Knitwear Designer into the GCSE home economics programme for our fourth and fifth years.

"This year, apart from our BBC Micros, we have six knitting machines and a colour printer so we should be able to realise the full potential of the new software".

Acorn sales slump 'just a hiccup'

ACORN's two-year battle to pull back from the brink of financial disaster has suffered a setback.

Sales revenues for the first six months of this year were down compared to the 1986 performance, and the company recorded a net loss of £1.38 million in the period after making a £298,000 profit in the first half of last year.

But Acorn has dismissed the results as a mere hiccup on the road to recovery.

The company says it expected the investment necessary to launch the Archimedes and its associated products to have a significant impact on the half-term results.

"The Master series continued to sell well, although effective early promotion for Archimedes led to a slowing down in sales in the second quarter as customers evaluated the new line", said managing director Brian Long.

"In addition to the continuing research and development expenditure, heavy costs of manufacturing and marketing start-up were incurred.

"We anticipated these costs and planned for them out of the revenue accruing from the existing products.

"In spite of flat sales and heavy expenditures we controlled our cash position effectively – at the end of June our overdraft was £2.8 million, the same as at the end of 1986 and well within our facilities of £16 million".

Turnover in the first six months of 1987 was down more than £500,000 from last year's £19.6 million. The operating loss was £950,000 and £430,000 interest charges were incurred.

Acorn says its new products have been greeted with enthusiasm "by both existing and potential purchasers and users in many sectors".

A statement issued with the balance sheet said: "The renewal and extension of the licensing agreement with the BBC for the entry level Archimedes 300 machines and the BBC's continuing commitment to the development of computer literacy is widely welcomed.

"Acorn's strategic commitment to international standards, and in particular the Unix operating system, is reflected in the product specifications".

Brian Long added: "The existing software portfolio is being strengthened by quality packages from a wide range of independent software vendors.

"We are particularly excited about those packages which are beginning to make effective use of the exceptional power that Archimedes machines offer, and we are opening up opportunities to provide total systems to markets where we have not traditionally been suppliers".

New products line up for big show

SEVERAL major exhibitors at the Electron & BBC Micro User Show in November have begun to reveal details of the new products and bargain offers they will be bringing with them.

Although many firms are still keeping their new products under wraps, there's enough evidence of exciting developments to confirm that once again the New Horticultural Hall, Westminster, is the place for BBC Micro, Master and Archimedes users to be from November 13 to 15.

Watford Electronics will unveil a host of new products for the BBC Micro – including a 30Mb Winchester, intelligent printer sharer and disc sharer, Quest Paint extension rom, graphic-based front end rom for DFS and Quest publishing software. The firm will also preview a range of add-ons for the Archimedes.

Six new business packages will be launched by Minerva Systems. For the BBC Micro are a Newsagents package price £69.95, System Gamma price £49.95 and Delta Base price £29.95. Archimedes users are offered System Delta Plus at £69.95, Reporter at £24.95 and Accountancy Suite at £324.75 or £64.95 for each individual

Turn to Page 9 ▶

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Star NX15	**£410.00**
Star NB24/10 (216cps)	**£599.00**
Juki Daisywheel	**£330.00**

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The CJE packs include; Cable, delivery, paper, plug, utility software and booklet. Please ask for further details.
The Printer packs cost £15.00 with printer: e.g. NL10 + pack = £260 + £15 = £275 inc. VAT.
BBC Cable if purchased separately is £8.00. Software on its own: £11.00 + £1 p&p.

Show preview

◄ From Page 7

module. An Archimedes version of its Fontaid program will be released by CJE Micros, price £30.

Centec's new range of 3.5 and 5.25in discs will be available at "substantially special" introductory prices. The firm is also increasing its range to include printer paper.

A new auto-routing package for the BBC Micro will be available from Pineapple Software. It allows menus to be designed and altered to the user's own specifications. Price £85.

Computer Concepts will be previewing two projects it is working on for the Archimedes – a word processor and programmable CAD package.

Norwich Computer Services will reveal its plans for a technical hotline and other user support for the Archimedes.

A series of Blue Ribbon budget-priced dual cassettes for the BBC Micro will be launched by CDS Software. Priced £1.99 each are Golf, Morph, Video Arcade, Trapper, Keyhunt and Return of R2. The firm also hopes to have the BBC version of Colossus Bridge available in time for the show.

Four new BBC Micro programs are on their way from BBC Software – contract bridge game Black Queen, strategy game Bismarck, primary reading program Jordie Racer – all at £14.95 – and Spanish language tutor España Viva which costs £22.95.

WeServe is selling its Recall and Printer Buffer Utility for the BBC Micro and Master at £4.95 – £10 off the usual price – and offering its complete range of printers at discounts of £10 to £20.

The Electron & BBC Micro User Show runs from Friday to Sunday, November 13 to 15. A money-saving advance ticket order form appears on Page 6.

Award for best DTP book

A FOURTH major category has been added to the list of Desktop Publishing Awards to be presented this autumn.

Already the search is on to find the best DTP newspaper or magazine, in-house company report, and leaflet or newsletter. Now the contest enters the world of books.

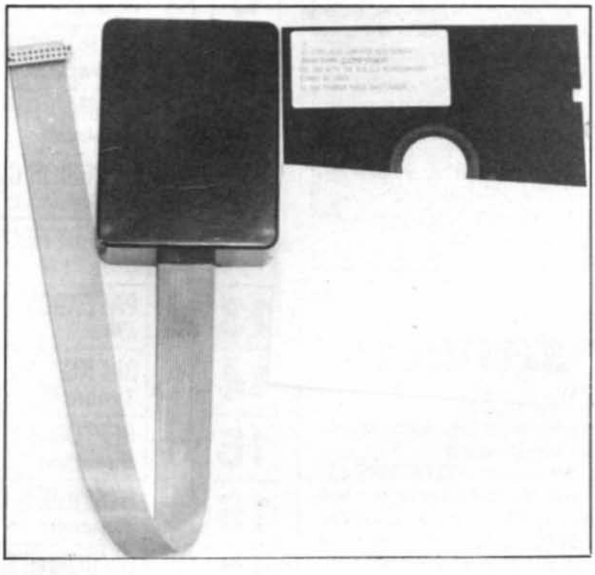
The extra award, for the best example of a book predominantly DTP produced has been introduced in response to appeals from the book publishing sector of the massive DTP industry – estimated to be worth £300 million by 1988.

Sponsored by PIRA, the UK technology centre for the printing and publishing industries, the winners of the awards will be announced at the prestige showcase, the Desktop Publishing Show, being held at the Business Design Centre in London from October 15 to 17.

A panel of expert judges drawn from the fields of both design and print will make the final decisions.

Entries should be sent to the The Desktop Publishing Awards 1987, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

"We are happy to extend the awards to cover books because we believe there will eventually be a vast range of applications for this exciting new technology," said the PIRA's Tom Hunter-Craig.



ENHANCED DRUMS

MORE software has been produced to enhance the Rice Digital Drum attachment for the BBC Micro.

The new package has additional drum sounds including hand clap, and a built-in echo effect which can be applied to individual channels.

There are four different types of synthesized bass sound available from the harmonic synthesiser, picking strength can be adjusted, and sections of the operating system have been converted from Basic to machine code for better performance.

Basic drum unit – digital to analogue converter and rhythm composer – costs £47.50, drum unit with bass synthesiser and sequencer software costs £85.

New number

IN the September edition of The Micro User *we printed the telephone number of Lancaster Consultants. This has now changed to 0524 65179.*

Making music

A NEW package which is designed to revolutionise the original Acorn Music 500 music system has been released by Peartree Computers.

The Music 87, for BBC Micros and Masters, is designed to overcome problems of using the original programming language Ample.

Marketing manager of Peartree (0480 50595) Chris Gee said that Ample was very hard to learn, but with Music 87 no programming is required.

"Our new software is a complete top end for the language providing menus and the opportunity to use a mouse and light pen. It also offers a wave form designer and a sound shaper", he said.

The software can be bought separately by existing Music 500 and Music 5000 users. It costs £39.95.

The whole package also includes a synthesiser box which plugs into the 1Mhz bus and produces all the sounds. The total cost is £79.95.

"An expert who used it recently declared it five times as fast as the original", said Chris Gee.

NEWS

Champagne Cameron

A NATIONWIDE electronic mail competition offering a magnum of champagne as the star prize resulted in a giant hangover when the winner unwittingly caused the software in the central computer to crash.

When ex San Francisco police officer Cameron (Cam) Lacey posted the 10,000th message on the MicroLink bulletin board from his office in Grimsby, all that should have happened was that he received a three litre bottle of Moet & Chandon to mark the milestone achievement.

Unfortunately what no one realised at that time was that the BBS system was only designed to cope with a data field of four characters – up to and including 9,999.

So when just one additional message was received, it was as if a giant fuse had blown.

When the crash came there was consternation at MicroLink headquarters. What made matters worse was that technical chief Tim Clarkson was on holiday and all attempts by his staff to revive Britain's biggest bulletin board were unsuccessful.

After two hours of frantic transatlantic telephone calls, the American authors of the bulletin board software finally traced the problem.

They were, however, unable to make the message numbering system accept a figure larger than 9,999. All they could do was make room by deleting the first 5,000 messages.

In fact, the only person left with a grin on his face was Cameron Lacey.

Mind you – according to MicroLink boss Derek Meakin – it should have been a sheepish one. For it seems that Cam cheated a little bit.

"He'd obviously written a program that started sending identical messages just as the number of messages on the board was approaching the 10,000 mark".

All the messages said was: "Is this the one?"

Monitor safety

MICROVITEC is launching a metal cabinet monitor especially for the Archimedes. But with it comes a warning.

The Yorkshire company was alarmed to read suggestions that its Cub series monitors could be adapted by reconnecting some of the circuitry.

Marketing manager Jim Whitson said: "Microvitec would advise strongly against this being attempted. Monitors use high voltages, and injuries may well result if an unskilled person tries to make these changes.

"The modification is in itself unsatisfactory and anyone using a monitor modified in this way will not obtain the usual high quality of display.

"The danger to unskilled people attempting to modify monitors of any kind cannot be overstressed".

Microvitec (0274 390011) says the new monitor, the MS/1445, priced at under £300, is currently the only metal cabinet monitor available for the Archimedes.

New home

AFTER four years during which it claims to have become the largest BBC Micro specialist dealer in the North West, Microman Computers (074-488 3667) has moved to new premises near St Helens, Merseyside.

The converted stone barn at Rainford contains two large showrooms with extended facilities for demonstrating computers, peripherals and software.

THE GALLUP CHART TOP 20

BBC SOFTWARE

THIS MONTH	LAST MONTH	TITLE (Software House)	TAPE PRICE
1	1	**GRANDPRIX CONSTRUCTION SET** *Superior*	9.95
2	18	**SPY VS SPY** *Tynesoft*	9.95
3	3	**DUNJUNZ** *Bug-Byte*	2.99
4	4	**CODENAME DROID** *Superior*	9.95
5	●	**CRAZEE RIDER** *Superior*	9.95
6	6	**SUPERIOR COLLECTION VOL 1** *Superior*	9.95
7	5	**PHANTOM** *Tynesoft*	7.95
8	2	**AROUND THE WORLD IN 40 SCREENS** *Superior*	8.95
9	10	**MICROPOWER MAGIC** *Micropower*	7.95
10	13	**COMMONWEALTH GAMES** *Tynesoft*	6.95
11	7	**SUPERIOR COLLECTION VOL 2** *Superior*	9.99
12	●	**BUG-BYTE COMPILATION** *Bug-Byte*	7.95
13	9	**PAPERBOY** *Elite*	9.95
14	16	**BIG KO** *Tynesoft*	7.95
15	12	**REPTON 3** *Superior*	9.95
16	11	**STRYKER'S RUN** *Superior*	9.95
17	●	**GISBURNE'S CASTLE** *Ricochet*	1.99
18	●	**ARKANOID** *Imagine*	8.95
19	20	**WINTER OLYMPICS** *Tynesoft*	7.95
20	●	**MINI OFFICE II** *Database Software*	14.95

Compiled by Gallup/Microscope

There are four new entries this month, as well as Mini Office II re-entering at number 20. Superior keep first position with Grand Prix Construction Set and you can see a review of its new game in this month's issue of *The Micro User*.

RISC USER THE ARCHIMEDES MAGAZINE AND SUPPORT GROUP

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RISC USER is all about the Archimedes, it does not contain modified programs originally intended for the BBC Model B or Master. It is published 10 times a year and is only available on subscription, not through the shops.

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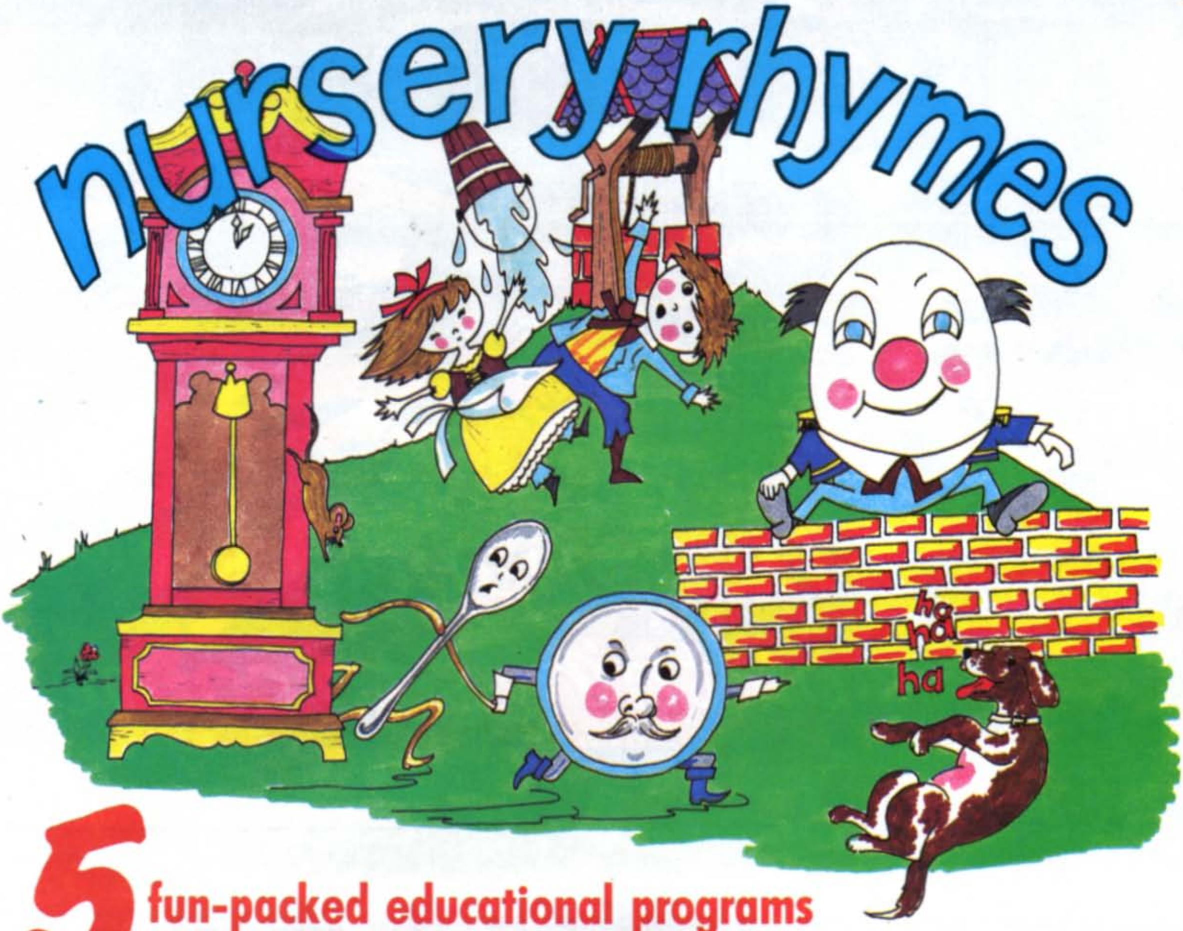

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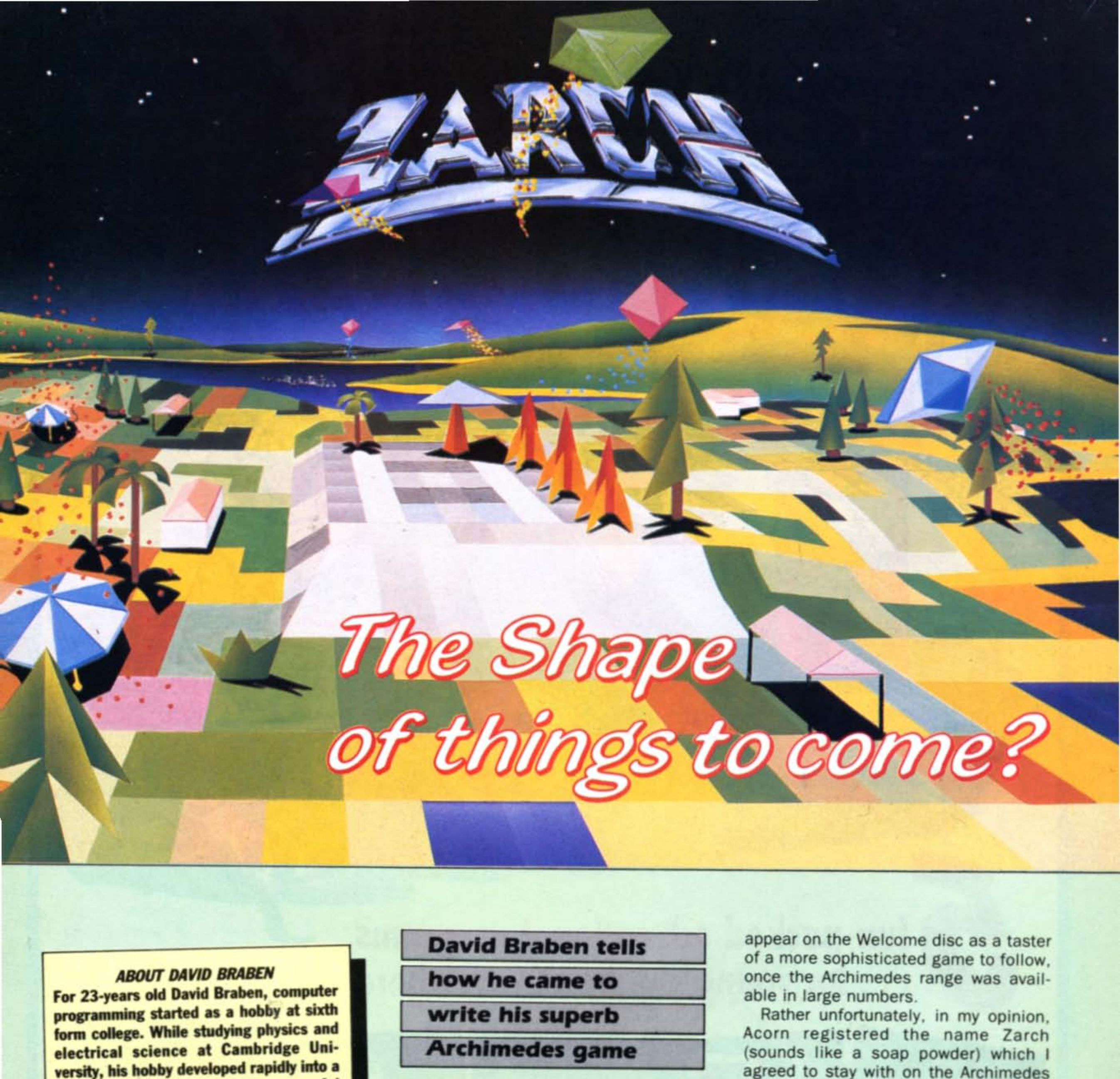

The Shape of things to come?

David Braben tells how he came to write his superb Archimedes game

SINCE writing Elite with Ian Bell, I have had good ties with Acorn, and knew about the ARM project from fairly early on. When, in September 1986, I heard that development machines (known confusingly as A500s, but similar to A440s in specification) were being made, I asked for one for evaluation. I finally had one for two weeks in January.

I had been working on various 3D landscape algorithms on the (old) BBC Micro for the Elite sequel, each being either too slow, or not looking good. I realised what could be done on the ARM with these routines, so I wrote Lander. This uses one of the simplest techniques, since there was very little time to complete it (about two months) and, at that time, I was not particularly familiar with ARM code.

The tight schedule meant Lander had to be fairly simple, hence this was to appear on the Welcome disc as a taster of a more sophisticated game to follow, once the Archimedes range was available in large numbers.

Rather unfortunately, in my opinion, Acorn registered the name Zarch (sounds like a soap powder) which I agreed to stay with on the Archimedes computers. However, the game may be appearing, in a slightly inferior form, on the Commodore Amiga and perhaps the Atari ST under a different name (not STarch).

Lander was conceived as a game which was pretty to look at and involved a great deal of fast motion. Since the player's craft is capable of quite high speeds, a high frame rate is needed to avoid objects moving with too great a step size and spoiling the sensation of motion.

Because of the restrictions of the particular landscape routine chosen – a fixed tile size – the view cannot go very far to the horizon before there is a serious speed loss.

Also speed considerations restricted the direction of view to a constant (to avoid the overhead of additional rotating and clipping), although on very early versions of the game this was not the case (this code was used to produce the

ABOUT DAVID BRABEN

For 23-years old David Braben, computer programming started as a hobby at sixth form college. While studying physics and electrical science at Cambridge University, his hobby developed rapidly into a career stemming from his successful collaboration with a friend and fellow computer programmer, Ian Bell.

Their partnership resulted in the computer industry's most highly acclaimed game, Elite, which has earned David well over a six figure income enabling him to buy a flat in Cambridge and a blue Audi Quattro.

He enjoys working on new and challenging programming projects, sailing, music, watching sci-fi films, as well as nipping to his local for a pint of cider. His passion for the film industry goes beyond watching his favourite film, Alien, as he hopes to work on computer graphics for both the film and television industry.

Since finishing Zarch, a revolutionary and thoroughly unique Archiemedes game for Superior Software, he is now working on a follow-up to Elite.

Union Jack demo, which can rotate about any axis).

Together, these problems meant a first person view, as in Elite, was not practical with the tight schedule, so the third person view of Lander and Zarch was used.

With the display technique chosen, the frame rate dictated the approximate number of tiles which could be used and also the amount of scenery. The display looks much better if these are greatly increased – as the picture on this page shows – but sadly this reduces the frame rate to only one or two frames per second – a succession of stills.

To avoid flickering bank-switching, which uses two screens with all plotting being done to the hidden one, is used. They are switched when a frame is finished. However, this requires twice as much screen memory.

Both Lander and Zarch use Mode 13, a 256 colour equivalent of Mode 1. There was almost no choice as to the screen mode to use, since 256 colours gives the required scope for shading and lighting, and there is no (hardware) lower resolution with this number of colours available. (Mode 10, the 256 colour Mode 2, is really Mode 13, but with the operating system plotting double pixels, so there is no advantage using this mode.)

Mode 15, a 256 colour Mode 0 was not used for two reasons. Firstly, it doesn't leave much memory on an A305 (320k for both screens). Secondly, the video chip VIDC uses up memory bandwidth in the higher memory modes, and so slows down the processor.

Since it would also require the graphics routines to plot a greater area, the game would run significantly slower, so less detail could be plotted.

The graphics on Zarch and Lander are quite simple. The hidden line removal routine uses an Elite-like method to filter out some of the triangles, and then depth sorts all the graphic elements, including particles before plotting them. This means that shapes go in front of each other in the correct fashion.

The problem with sorting is it is normally a relatively slow process. The simplest techniques, such as bubble sorting, take of order n^2 operations, where n is the number of objects. In Zarch, this can be several thousand, so even on an ARM, it could take over a minute a frame.

The best general sorting algorithms such as quicksort, take of order n log(n) steps, and are still a bit slow. However, since objects only need to be approximately in order, and it is known that the values are in a certain range, a technique known as bin sorting is used.

This involves having a buffer for each of a range of depth values, and when an object's position is calculated it is put into the relevant buffer. Finally the buffers are flushed in depth order, farthest first. This requires a great deal of memory, but is virtually free as far as time considerations go.

Another technique used is colour keying the depth. This is clearly trivial, but gives a good effect and is achieved by varying levels of white according to the depth of an object in the screen.

This is actually not what would be seen – colour tends to be lost in the distance – but is more effective than the rounding towards grey that might be expected. With only 256 colours the steps seem more blatant with, for example, red suddenly becoming grey.

Shadows are almost essential; it is surprisingly hard to judge height without them. They are also quite easy to simulate if you are allowed a little artistic licence. Firstly each node of each shape is projected on to the landscape vertically, for speed, then they are projected to the screen in the normal fashion, and joined up with black triangles.

This method is clearly incorrect since it does not allow for the curve of the landscape, nor does it allow for scenery – no, shadows don't go over houses or other shapes.

All shapes are lit from above and slightly to the left to give a better 3D effect, and to emphasise the shadows. This is done by calculating the angle between a light ray and each face of the shape. The brightness of the face is then some function of that angle. Lander and Zarch use:

Brightness = k * SIN(angle)

FaceColour = BaseColour + Brightness * White

Where *k* is the number of shades available for lighting, and *White* is the smallest amount of white available.

The advantage of a relatively simple game like Zarch is that it can be broken up into a small number of major routines each of which has a well defined task:

Animate object	nasties, player, missiles
General particle	bullets, debris, parachutes, spray
Landscape	
Scenery	trees, houses, radar

The object routine has a list of objects, each of which have a list of attributes including position, velocity and a driving routine pointer. This makes the code very simple indeed.

The driving routines are called every game cycle for each object, and these routines, different for each object type, take care of the behaviour of that object. This leaves the object routine loop to do such things common to all as plotting and hit checking.

The particle routine, although similar in principle to the object routine, has more compact data, and rather than call a routine for each particle, each has a

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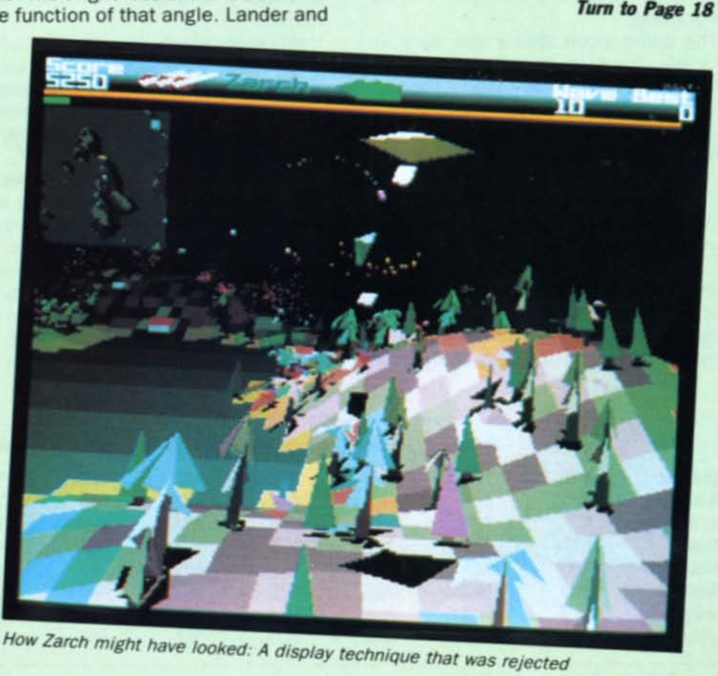

How Zarch might have looked: A display technique that was rejected

◀ *From Page 17*

flags word with each bit determining some aspect of its behaviour. Some of these are shown in Figure I.

This makes for simple but powerful code, testing the appropriate flags with a mask where necessary. The object routine and the particle routine could have been combined, but this was not done for memory considerations, as there may be many hundreds of particles at any one time.

The landscape routine obtains the rolling hillside effect by simply adding a set of pseudo-random sine waves, which are clipped at a fixed height to give the water. As a look-up table is used to calculate the sine values, this technique is very fast. The landscape is a bit too uniform without the water, which of course is very easy to add.

It is all very well having a collection of impressive graphics routines, but for a commercial game they must be linked by a consistent, fun-to-play scenario. Lander perhaps falls some way short of this, but Zarch can be quite addictive.

Zarch is definitely in the quick reaction, shoot-em-up category, and so will perhaps have a shorter commercial lifetime than, say, Elite. It is very hard to play at first. The mouse controls are very different to other games, but once you get the hang of flying the craft it is quite satisfying – and there is scope for some fancy flying.

The demo mode shows how easy, in principle, the craft is to fly. It works by intercepting the mouse-reading routine, calculating a sensible path to fly along, and returning values for the mouse position and button presses, as if they had come from the mouse reader.

This requires less than a screenful of ARM (Basic assembler) source code, admittedly using multi-statement lines (single statement lines are for people with shares in timber companies, or weenies who insist on writing a paragraph of comments on each instruction). What is surprising is it generally does better than a human player.

The idea behind the game is straightforward. Nasties spray red gunge across a landscape which the player is attempting to protect. This gunge affects different foliage in different ways. Some types are unaffected, some die, and some mutate.

There are two reasons the player shouldn't be keen on this happening: It reduces the bonus score at the end of every attack wave, and the nasties use these mutated plants to mutate themselves. The player can of course destroy any foliage, but usually it is very hard to keep up with the bad guys' spray rate.

In the time honoured tradition, the bad guys get nastier and more numerous as the player progresses, and there are hillier landscapes, which make flying fast and low quite hard.

Other frills are increasing gravity, and radar stations which, if destroyed, leave a hole in that region on the player's scanner. There will be a competition, hence there is an Elite-like competition entry number and silly message, for those players who get sufficiently far.

In my opinion the Archimedes series are great machines, and Zarch does not exploit their full potential. I expect that before long there will be more impressive games from other programmers who have had more time. Such techniques as real-time ray tracing, to show things like reflections, may be possible for simple scenes.

However, the Archimedes is not perfect. As far as programming goes, the operating system interface is simple to use, but the lack of true multi-tasking may cramp the style of later applications.

Perhaps more significant, given the adherence to compatibility, is the sound interface, which is poor given the power of the hardware. There are no BBC Micro-style sound envelopes, as far as I know, and it is not possible to dynamically change sound parameters, to give, for example, a slowly rising note, with the current operating system – a step backwards from the old BBC Micro.

	spark	**spray**	**bullet**	**parachute**	**smoke**	**virus**	**debris**
gravity	YES	YES	YES	NO	NO	YES	YES
bouncing	YES	NO	NO	NO	NO	NO	YES
splashing	YES	NO	YES	YES	NO	YES	YES
fading	YES	NO	NO	NO	NO	NO	NO
hitting	NO	NO	YES	YES	NO	NO	NO
exploding	NO	NO	YES	YES	NO	NO	NO
mutating	NO	NO	NO	YES	NO	YES	NO
swinging	NO	NO	NO	YES	NO	NO	NO

Figure I: Some of the particle behaviour flags

It is a shame that Acorn chose to release their smallest machine with only 512k of memory, since it will tend to restrict early applications.

Although this may seem a great deal of memory, which it undeniably is for Basic programs, the sort of applications that the speed of the processor make possible, such as Zarch, tend to eat large areas of memory for look-up tables and workspace, especially when using the hi-res screens.

Also, ARM machine code tends to be significantly larger than 6502 code for the same function, so running compilers is probably out of the question on an A305 (the C compiler is over 250k long, without libraries). Before long, it will probably have the unsupported Model A status of the past, since the upgrade to an A310 is relatively cheap and easy to do.

I expect that there will be some very impressive applications for these machines, particularly CAD. The A440 compares well with a Dec MicroVax (similar in power to an 11/780) for integer operations, and presumably floating point will follow with the release of the floating point co-processor.

The reason such machines as the MicroVax are still superior is the tremendous software base, especially the high quality of the optimising compilers. If Acorn was to bundle a good optimising compiler – C perhaps? – with the A400s, or at least if one were available, this might do a lot for the machine.

It seems that nowadays a large proportion of the market judges the quality of a game by its graphics rather than the depth of play. Because of this, most software houses are moving their emphasis from 8 to 16/32 bit machines for prestigious new releases.

This seems a shame for those people with 8 bit machines, where their potential has still not been fully exploited, particularly in the area of disc-based games and use of additional ram.

Certainly with the sequel to Elite we intend to support the BBC Micro/Master range. I have also seen a pre-release BBC Micro game from Peter Irvin (Starship Command) and Jeremy Smith (Thrust) which is potentially superb – watch out for it.

Ultimately, it seems likely that the games and the film industry will converge – presumably with the latter absorbing the former. This should be quite fun (interactive Bond films?) but is a little way away yet. Nevertheless, the Archimedes is a step in the right direction.

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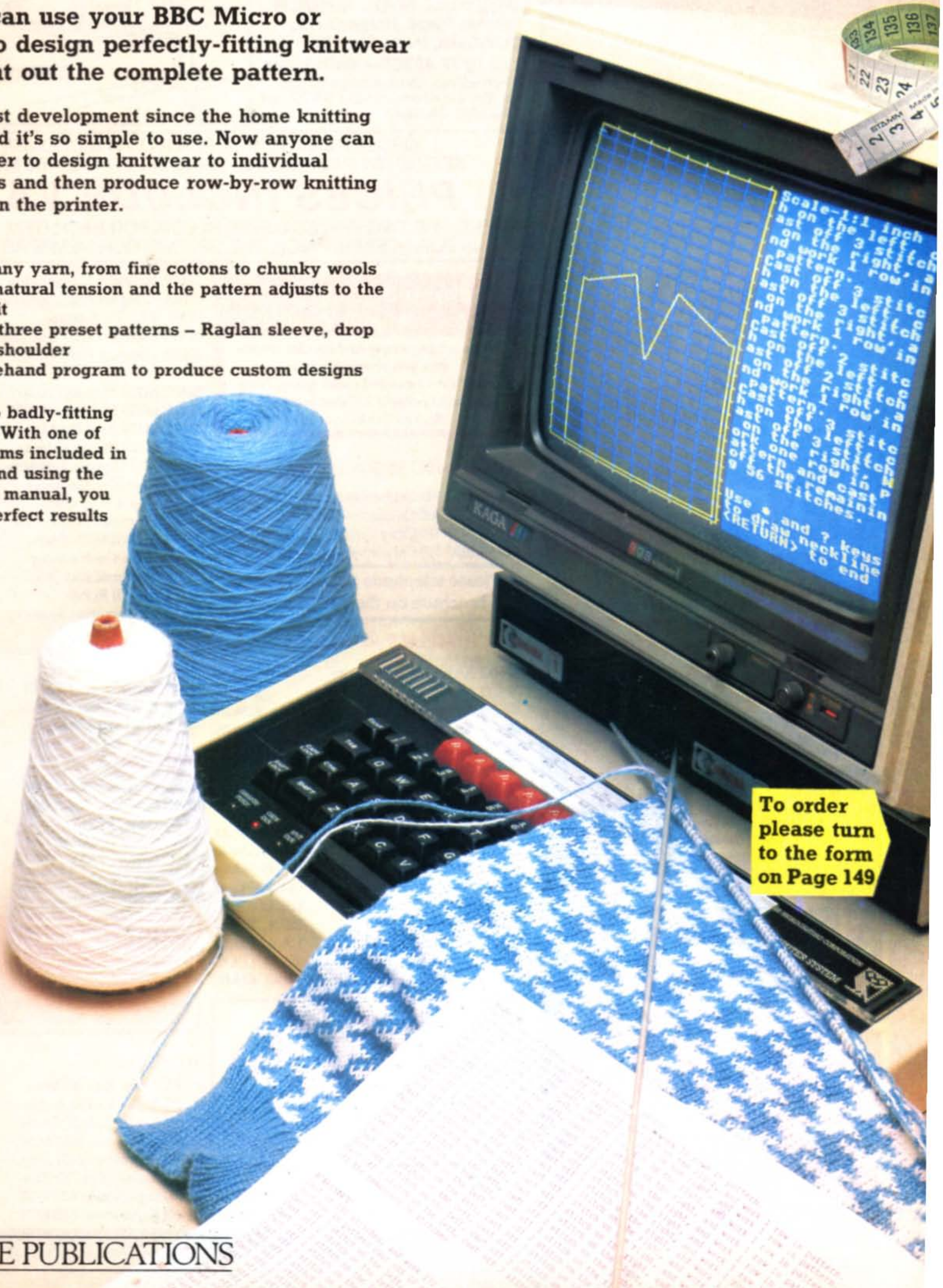

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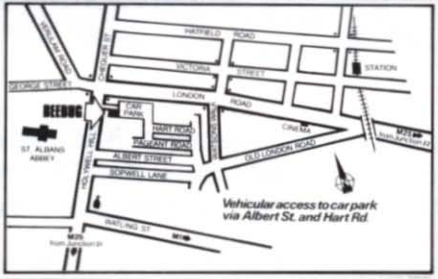

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Three looks at C

Steve Turnbull compares three versions of this powerful language

C IS a powerful compiled high-level language with similar control structures to Pascal, but which allows programmers easy access to the machine memory and hardware.

For this reason it has become very popular with systems programmers who use it for developing big machine code programs like operating systems and compilers. However, its range of data handling facilities and control structures make it ideal for almost any application – even writing games.

The original C, by D. Ritchie, was developed from the language BCPL (which is available for the BBC Micro series) and did away with a lot of the ambiguities and unnecessary wordiness of BCPL.

The C Programming Language by Kernighan and Ritchie (Prentice-Hall 1978) is the bible of C and although not an official standard – the ISO standard for C is still being prepared – it is regarded as the one to follow.

While most 16 bit micros, even though released after the BBC Micro, have had C for some time, the existence of BCPL on the BBC Micro seems to have prevented anyone from bringing out this excellent language. Until now. Suddenly three versions have appeared almost simultaneously and this review will help you untangle the choices of which to buy.

Acornsoft C

This version comes in the familiar book/box with a 5.25in disc(80 track only) and a 3.5in disc, a spiral-bound A5 manual of 250 pages and a sheet of configuration notes.

The minimum requirements for this system are either a Model B or B+ with second processor, a B+128, a Master (not necessarily with Turbo) or a Compact.

There are two basic setups: The sideways ram version which loads four rom images into the banks available on the B+128, Master or Compact, or the second processor configuration for BBC Micro plus second processor or Master Turbo.

```
C>COMPILE HelloW
Acornsoft-BSC C Compiler V1.00
Including h.stdio
code: 0x0042 data: 0x000E total:
0x0050
C>LINK HelloW
Acornsoft-BSC C Linker V1.00
code: 0x205F data: 0x0218 total:
0x2277
C>HelloW
Hello World !
C>
```

Figure I: Compiling using Acornsoft C

And after backing up your disc you can select which version you prefer – in this review I used the rom image version. Having loaded the images and pressing Control+Break, a simple *C enters the Acornsoft C environment.

The manual has a very clean layout and style, using the standard Acornsoft no-frills approach of explaining each fact just once in the appropriate place.

However, if you're not familiar with C (or another similar high-level language) you should not even attempt to read the manual beyond the initial tutorial stage as it will mean nothing. Get a book on C first – appendix E gives a list of suitable material to read. One big chapter covers the use of the editor.

The Acornsoft C environment is simplicity to use: First you write your program using the text editor provided (similar to Edit in the Master). Then to compile and link it (that means turn it into executable code) you follow the steps in Figure I.

Or the compile-link-run sequence can all be done in one command with:

```
C>COMPILE HelloW -l -r
```

One of the key features of C is the ability to include libraries of pre-written routines into new programs so that a full modular approach to programming can be used.

In Figure I the line:

```
Including h.stdio
```

indicates that the standard input and output routines are being included in the program. Acornsoft C provides a complete set of library routines and half the manual is devoted to explaining the routines supplied.

Acornsoft	Beebug	Brasscourt
EDIT	–	*EDT
COMPILE	COMPILE	*CC
LINK	LINK	*ASM
MODE	MODE	–
REPORT	REPORT	–
SETPATH	–	–
SHOWPATH	–	–
CLOSE	CLOSE	–
TRACE	*	–

*Trace available as a compile option

Table I: Comparison of C Environment commands

This version of C sticks very closely to the standards that exist and includes many of the enhancements that will be part of the new standard. But it is limited by the configurations it will run on.

Beebug C

I received a pre-release copy of Beebug C so the full packaging was not available. But you get two roms, a dual format 40/80 disc and an incomplete spiral-bound 100 page A5 manual.

The system will run on any configuration of model B, B+ or Master with or without 6502 second processor or Turbo. Once the roms are plugged in and the machine switched on all that's needed is *C to enter the Beebug C environment. No text editor is supplied with this version and you are expected to use a standard word processor that can produce Ascii files.

The manual has a friendly and quite explanatory text (although it is still not a guide to writing C) but only lists the functions available in the library files with a brief description of their operation in my pre-production version.

The operation of the Beebug C compiler is virtually identical to that of the Acornsoft C. The basic commands are identical – see Table I – and just as easy to use.

However, Beebug C is about five times faster at compilation and linking than the Acornsoft version and produces code at a fraction the length. This is because only the library routines that are required are compiled, rather than all the routines in the included library file.

Beebug C is just as standard as Acornsoft C and I was left with the confident feeling that programs that compiled on one would compile on the other. The only real difference I could find was in the machine specific operating system calls. The rest of the library – as listed – seemed identical.

One reason for the extremely compact executable code that is produced is that this version makes no attempt to produce stand alone code. The system has a built-in virtual machine and the machine code produced is for this invented machine. To run Beebug C code without the roms you need another program called *rtsys*, which is not supplied with the system and must be bought separately.

Brasscourt C

The Brasscourt package is supplied on disc only with the manual and a copyright protection key. This is a plug which goes on to the user port and has some cross-wiring in a unique pattern: Some of the programs on the disc

◄ *From Page 23*

require this dongle to be connected before they will work.

This is a fairly simple but effective method of software protection – it's easy to backup the disc, but hard to duplicate the key.

The system is just a series of free-standing programs *run from whichever language you happen to be in and on the latest version the two main programs CC (compiler) and ASM (assembler) will run on both the model B and the Master, with or without second processor/Turbo. There is also a text editor supplied on the disc.

The manual consists of 90 A5 photocopied pages and has a rather didactic style. The second chapter does spend 40 pages explaining the elements of C as a language, but some of the more obscure ideas are poorly covered, leading to confusion.

The system is simple to use but differs radically from what would be considered standard. The compiler is invoked by:

```
*CC sourcefile objectfile
```

However, there is no linking as such involved because what the compiler does is to produce a special compacted form of 6502 assembler – as if you'd written the code in BBC Basic assembler instead of C. The ASM program then assembles this and any other program that you put into the command line into one 6502 machine code program.

There is another program on the disc which converts a BBC Basic style assembler listing into the compacted version for assembly in the ASM program.

Chapter three starts by stating that while the C library functions exist to provide a standard interface between implementations, the programmer does not need to use them. Only six standard functions are supported, plus the *stdio* header file (which you are recommended not to use).

Although it is true a programmer is not forced to use the standard library, using it makes C programs portable, which is a key element in the language.

While the demo programs from Acornsoft and Beebug each ran on the other system, neither program could be compiled on the Brasscourt system and the Brasscourt program was uncompilable on Beebug C and Acornsoft C.

The only real advantage of this system is that it does produce standalone 6502 machine code directly.

Summary

If you don't need to move your programs from machine to machine, or you're willing to purchase the extra program, then the Beebug version is fast and standard. But for a full blown implementation then (if you have the system to cope) the Acornsoft version will certainly suit. If the Brasscourt C was £20 then I could recommend it to anyone who merely wanted to experiment with C, but as it is the highest priced version, and provides the least, I cannot recommend it at all.

Product: C
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Supplier: Acornsoft, 645 Newmarket Rd., Cambridge, CB5 8PD.
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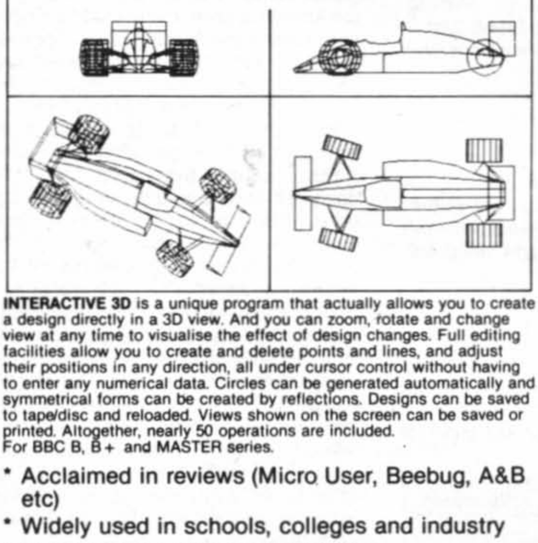

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Data sheet available on request.

SOLIDISK TWOMEG 128K:

The new style TWOMEG 128K memory combines Sideways RAM, four EPROM sockets and Shadow RAM on a single board, running at the same 2MHz speed at the BEEB. As you can imagine from the picture, it's unobstrusive and very easy to fit, just drop in and go. It's the ideal memory upgrade for all BEEBs. With plenty of ROM sockets (4 on the motherboard and 4 on the TWOMEG board) and 128K of additional RAM, it beats the MASTER hands down. We supply five software discs to support this excellent product. Price **£60.00 inc.**

SOLIDISK FOURMEG 32K UP TO 256K:

SPEED, Sideways RAM, shadow RAM and 4 or 5 H/C ROM sockets are combined on the features laden Solidisk FOURMEG series. All FOURMEG boards have a 4MHz GTE 65C02 CPU as standard, same as on the Acorn TURBO co-processor. The new CPU can run BASIC 4 (and many other languages) at twice the speed of the MASTER or the COMPACT.
Its performance is comparable to a MASTER fitted with the TURBO board (costing a great deal more). New reduced prices:

FOURMEG 32K, 32K RAM, 5 H/C ROM sockets, software support on disc	**£60.00 inc.**
Additional 32K RAM chip, optional, each	**£15.00 inc.**
FOURMEG 256K, 256K RAM, 4 H/C ROM sockets, software support on disc, new low price	**£100.00 inc.**
Software support disc, volumes 2 to 15, each	**£2.00 inc.**

Please specify 40 or 80 track disc formats.
Data sheet available on request.

SOLIDISK REAL TIME CLOCK:

The Real Time Clock can be plugged into any ROM socket on the BEEB motherboard with absolutely no wire attached. The Real Time Clock provides battery-backed TIME function (even usable with BASIC 4) and *CONFIGURE. Price **£29.00 inc.**
Data sheet available on request.

SIDEWAYS-RAM BOARDS:

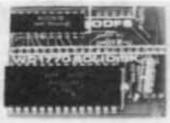
Sideways RAM can be used to load ROM images into the BEEB, make a printer buffer, store data and programs etc. Sideways RAM are additional memory to the basic 32K of the BEEB. To date, more than 50,000 BEEBs have been fitted with Solidisk Sideways RAM.

SWR32, 32K Sideways RAM + software disc No 1	**£20.00 inc.**
SWR64, 64K Sideways RAM, two H/C EPROM sockets + software disc No 1	**£30.00 inc.**
96K extension to SWR32	**£25.00 inc.**
SWR128 new style, 128K Sideways RAM, 2 H/C EPROM sockets + software disc No 1	**£45.00 inc.**
Software discs from 2 to 15, each	**£2.00 inc.**

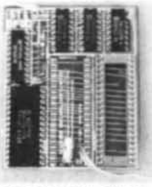
Please specify 40 or 80 track disc format.
Data sheet available on request.

ELECTRON EFS: LAST FEW!

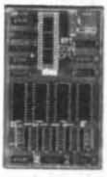
This excellent product combines a disc interface with DFS and ADFS, Solidisk Winchester port and 16K Sideways RAM. Price **£50.00 inc.**



WD-1770 DFS



WD-1770 + 8271



TWO MEG 128

REDUCED!

SPECIAL OFFERS!

LAST FEW!

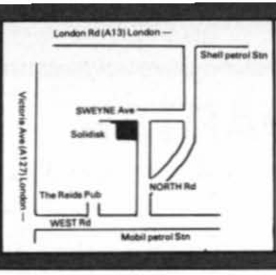
SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVENUE, SOUTHEND

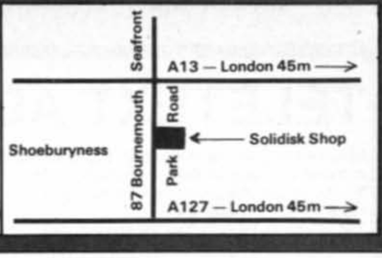
Address:

Shop and showroom:
87 Bournemouth Park Road,
Southend.
Mail order and Services:
17 Sweyne Avenue,
Southend SS2 6JQ

Telephone:

Shop and showroom:
Southend (0702) 616 818
Mail order:
Southend (0702) 354 674
Technical Services:
(0702) 43 11 22





MASTER:

Our typical MASTER systems comprise the MASTER with 128K RAM, wordprocessor, spreadsheet, ADFS 2.1 cartridge and choice of drives and monitors.

A — twin 3.5" drives.
B — twin 5.25 drives.
C — one 3.5" and one 5.25" drive.

The price of the complete system depends on the choice of monitor:

- without monitor:	**£640.00**
— with 12" green or amber monitor	**£730.00**
- with 14" colour (Philips CM8833 or Acorn) monitor	**£840.00**

Free demo disc with each system.
Data sheet available on request.

ONLY £1,086 + VAT (£1249 inc.) Best Price Promise!

COMPACT:

Our Master Compact systems comprise the COMPACT with 128K RAM, CDFS 2.1 ROM, the same choice of disc drives as with our MASTER systems and choice of monitor.

- with TV modulator	**£499 inc.**
- with 12" green Acorn monitor	**£599 inc.**
- with 14" colour Acorn monitor	**£759 inc.**

Free demo disc with each system.

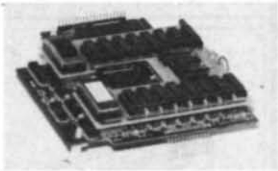
THE PC-500:

The PC-500 is just what you need to take advantage of the biggest software investment on earth: PC software, PC public domain and PC shareware.

The PC-500 is the Acorn 80186 internal co-processor for the MASTER adapted by Solidisk with an appropriate lead for use on the BEEB (and the Master).

It has a mouse, 512K of RAM, 10MHz — 16 bit CPU (around 3 times the speed of the normal PC), 4 software discs containing the Digital GEM operating system, a wordprocessor, a painting program, CPM emulator and other utilities.

Price: **£239 inclusive.** Your BEEB must have a WD-1770 and ADFS.
Data sheet available on request.

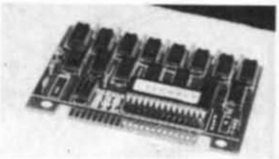


THE PC-PLUS:

The PC-PLUS is an expanded PC-500, with one Megabyte of RAM instead of 512K. The extra memory allows large applications such as Desk Top Publishing (eg Fleet Street Editor) to be used on the BEEB or the MASTER.

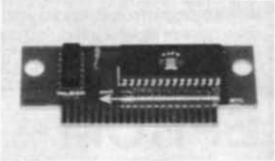
The PC-PLUS is supplied with the same accessories as the PC-500 including the mouse and 4 discs. Price **£339 inc.**

Upgrade from an existing Acorn 80186 costs **£119.00** but you will be required to sign a service agreement. Please ring for details.
Data sheet available on request.



TURBO-BEEB:

The TURBO-BEEB plugs directly into the TUBE connector of your BEEB and consists of the Acorn TURBO 64K, 4MHz 65C02 internal co-processor for the MASTER adapted by Solidisk with an appropriate lead for use on the BEEB (and the Master), like the PC-500. Price **£135.00 inc.**
Data sheet available on request.



MASTER MEGA CARD:

The MEGA CARD (256K) plugs into a cartridge slot on the MASTER and adds instantly 256K of RAM. The card can be used as RAMDISK, printer buffer or sideways RAM. Price **£100.00 inc.**
Data sheet available on request.

MASTER ROM CARTRIDGE:

Our MASTER ROM CARTRIDGES can accommodate all software EPROM/ROM useable on the MASTER. They are small enough to be kept permanently inside the computer if you wish. Thus capable of accommodating bulky ROMs such as Interword and Interbase or protecting your ROM from being 'borrowed'. Price **£4.00** without plastic case, **£5.00** with plastic case. Prices start as low as **£1** each for large quantities.

SPECIAL DRIVE LEADS:

We have 3 different DRIVE SPECIAL LEAD SETS to accommodate two 3.5" drives or two 5.25" drives or one of each. Each set comprises a special data lead and a special power lead.

BEEB or MASTER	**£15.00**
COMPACT	**£17.00**
ARCHIMEDES	**£16.00**

IMPORTANT NOTICE ON TRADE UP:

Solidisk will accept return of STL memory board up to one YEAR old for TRADING UP. The selling price (below) is the price we sell at the time of the trade-up transaction. In all cases, the minimum balance must be at least £25.00 inclusive of VAT.

Age	Trade-up allowance
Up to 3 months	90% of selling price
Up to 6 months	75% of selling price
Up to 12 months	50% of selling price

BEST PRICE PROMISE:

We guarantee that our prices on selected systems are THE BEST and to prove it, we promise you that if you find the same system sold cheaper by any other officially listed Acorn dealer within ten days of your purchase, we will refund you the difference. Our PRICE PROMISE does not affect your statutory rights.

MASTERPLAN:

If you are thinking of exchanging your BEEB for a MASTER or an ARCHIMEDES, Solidisk MASTERPLAN is for you. We can quote immediately over the phone the buy-back value of your BEEB and the balance on your new system. So please give us a try!

ORDERING BY POST:

All items can be ordered by post, sending the coupon below and enclosing cheques, POs, drafts or credit card numbers or by phone. P and P is charged as follows:
Less than 1 KG (eg software, cartridges and books): **£2.00**
Up to 3 KGs (eg single disc drives): **£3.00**
Up to 10 KGs (eg computer, monitors, printers, twin disc drives): you can specify either parcel post £6.00 or courrier/Datapost: **£12.00.**
Above 10 KGs (eg complete system), please either allow generously or give us a ring for quotation.

Please fill and send to:
Solidisk Technology Ltd
17 Sweyne Avenue
Southend-on-Sea,
Essex SS2 6JQ

Name: ....

Address: ....

....

....

Items: ....

....

Price: ....

P&P: £2/£3/£6/£12

Total: ....

Access/Barclay VISA

Solidisk Technology Limited
17 Sweyne Avenue
Southend-on-Sea, Essex SS2 6JQ
Tel: Southend (0702) 354674 (16 lines)

ON-SEA, ESSEX SS2 6JQ TEL: SOUTHEND (0702) 354674 (16 lines)

TELETEXT ADAPTER

Would you like access to free high quality software and over a thousand pages of information, but Prestel access charges and phone bills too expensive? Then read on!

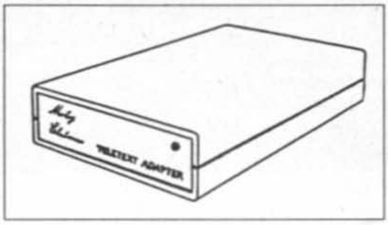
The answer is Teletext. Yes the same system everyone has seen incorporated into television sets, but with a difference. When Teletext is read by a computer you can actually use the data.

The MORLEY TELETEXT ADAPTER introduces you to the world of Teletext at a price that won't break the bank. Inside it you will find the latest in second generation Teletext chip technology, which unlike our rivals who are still using chips designed more than ten years ago, will be fully compatible with any future advances in the Teletext system.

With the Morley adapter you will get a state of the art unit that automatically tunes itself into the required station (no more messing around with screwdrivers or twiddling little knobs in the back of the case), a user friendly menu driven program, easy to follow instructions and a 12 month warranty. Add to this the free downloadable telesoftware and we are sure that you will agree that we are offering you one of the best bargains on the market today.

FEATURES:

* Advanced design uses the latest technology, will handle ANY future enhancements to the Teletext system e.g.: full field; 8 bit data transfer; 2k pages etc.
* Simply plugs into the user port.
* Low power consumption, less than 200ma. Optional power supply available.
* User friendly menu driven software including extended OSCLI and OSWord commands for access from BASIC programs.
* Supplied with 16k ATS (Advanced Teletext Software) and 16k support ROM software inc. printer dumps, page spoolers etc.
* FREE Telesoftware, no access charges (updated weekly).
* Save selected pages to disc/tape for later retrieval.
* Full access to all Teletext services and channels e.g.: CEEFAX, ORACLE, 4-TEL.
* Gives you a real-time clock at your disposal (*TIME).
* Software upgrades to allow for any enhancements to the Teletext service, e.g.: extra channels, full field data on cable & satellite systems etc. (only the media charge).
* Easy to follow comprehensive user guides.
* No hardware limitations, it can for example receive virtually unlimited numbers of channels.
* Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer (no more TV or Radio Times to buy).



WHAT THE REVIEWERS SAID:

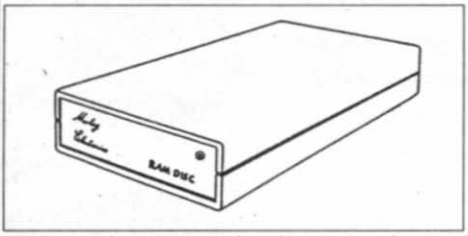
". . .In terms of price, performance, future expansion possibilities and those little touches that show thought for the end user I would recommend the Morley unit."–*(Acorn User, January, 1986).*

". . .The Morley unit has been designed to ensure that its operation is simple and smooth. It is the ideal Teletext adapter for school use."–*(A&B Computing, June, 1986).*

". . .Using it over a number of months in different schools, it has proved utterly reliable, and may confidently be recommended."–*(The Times Educational Supplement, September, 1986).*

THIS IS THE BIGGEST SELLING TELETEXT ADAPTER CURRENTLY IN PRODUCTION WORLDWIDE, AND COMES WITH A FULL MONEY BACK SATISFACTION GUARANTEE.

RAMDISC



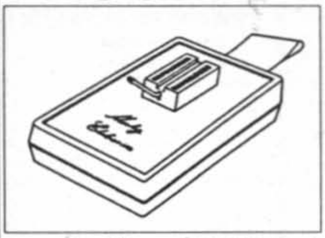
Now available! The first true MEGA capacity RAMdisc for the BBC, BBC B+ and MASTER computers. This fully compatible unit, currently available in either 1 or 2 megabyte versions comes complete with operating software on ROM, power supply, and a comprehensive user guide.

FEATURES:

One megabyte of RAM connected to the 1mHz bus. Used with the supplied ROM software programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase of speed, for example, a 20k mode 0 screen takes about 3-4 seconds to load from disc and about 0.2-0.3 seconds to load from the RAMdisc. The RAMdisc ROM operates as a utility ROM working with the current filing system rather than as a separate filing system. Therefore ensures compatibility with any Acorn compatible DFS (not ADFS). The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive number is 4. Any 'Dangerous' *commands such as *COMPACT, *COPY, *BACKUP etc can be intercepted and the BBC's RAM from page 2 to &7FFF saved to RAMdisc workspace, and may be recovered using a *command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The filing system wedge ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter verifier and 'sector' editor for use with the RAMdisc. Catalogue structure allows up to 2,688 files.

Well that's the spec., add to this our usual 12 month no quibble guarantee and we're sure you'll agree the Morley RAMdisc is the sensible alternative if increased storage capacity and speed is your requirement.

EPROM PROGRAMMER V2



The MORLEY EPROM PROGRAMMER V2 is a small self contained unit that plugs into the BBC or MASTER user port. It comes with a high quality ZIF (zero insertion force socket) and contrasting plastic case. Also included in the package is it's own user friendly menu driven software on ROM or disc.

This state of the art unit, allows programming of 2764 (8k), 27128 (16k), and 27256 (32k) EPROMS. Not only does the hardware allow programming of the usual NMOS devices, but will handle the new generation CMOS equally as well, and with the average time taken to program a 16k at less than 30 seconds we believe it to be one of the fastest programmers available today.

THE HARDWARE

The Unit is completely under software control, there are no knobs or switches to baffle the novice, and the extended features provided should excite the pro's.

THE SOFTWARE

The comprehensive user friendly software included in the package has two main parts, the first allows EPROMS to be read, programmed, verified and edited, also allowing a ROM image to be loaded or saved to disc. The second is a full ROM management system in its own right, which has a host of useful features and routines, such as KILL and RESURRECT ROM to disable or enable a sideways ROM, dump ROM image to buffer or disc, move ROM image in buffer to sideways RAM, and VIEW-SEARCH any sideways ROM.

The whole system is available now for less than the price of one WORDWISE chip. So get yourself the all new MORLEY EPROM PROGRAMMER V2 today and start using those expansion boards for what they were made for! ROMS.

Immediate delivery no quibble 12 month guarantee.

MASTER CARTRIDGE

Designed and manufactured by Care Electronics to Acorn specifications. These high quality Master expansion cartridges will take two 16k sideways ROM's, and will, unlike similar cartridges available from other manufacturers, accept the new second generation programs, such as Computer Concepts Interword and Spellmaster ROM's.

These Cartridges come in a high quality, robust, formed-plastic case, that fits neatly into either one of the Master's cartridge slots.

MASTER SMART CARTRIDGE

This device was designed and manufactured jointly by Morley and Care Electronics.

The **Smart** cartridge will at the press of a button halt any program running in memory and execute any one of a host of useful built in, or user defined procedures, and once completed will return to the program and continue where it left off. The only limiting factor with this device is the programmers imagination.

The **Smart** cartridge will prive useful to the novice, allowing him to do the simple things like dump any screen to printer, and make backups of protected tape or disc based software, but has an open ended specification for the advanced 'HACKER' allowing advanced programming techniques to be incorporated into almost any program at the touch of a button.

BUILT IN FEATURES (at the press of a button)

Autosaves computer's entire memory.
Freeze program at any point.
Screen dump (any mode) to printer or disc.
Allows any OSCLI command without disturbing memory.
Copies 90% of protected software.
Tape to disc, disc to tape.
User friendly menu.
Sound On/Off.

12 MONTH NO QUIBBLE WARRANTY
ALL CARTRIDGES COME WITH A

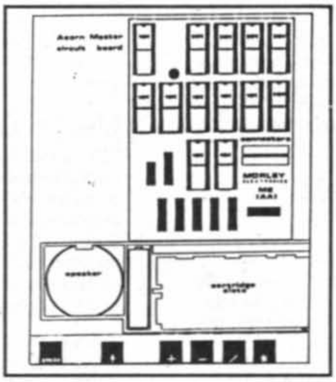
MORLEY MASTER BOARD 'AA'

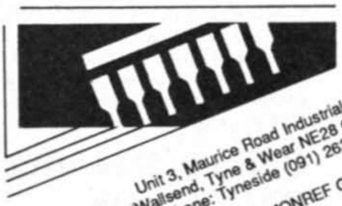
MORLEY
E·L·E·C·T·R·O·N·I·C·S

At long last the add-on all MASTER users have been waiting for, an internal ROM board.

No more need to turn the computer off to insert the cartridge containing the ROM you need to debug the program in memory.

The new **MORLEY MASTER BOARD "AA"** allows you to have up to 8x16k and 4x32k extra Roms installed inside your MASTER and still leaves the cartridge slots free. This in effect allows your MASTER to support as many as 24, 16k ROMs installed permanently, whilst retaining the standard 4 x sideways ram banks and four banks by using cartridges





Unit 3, Maurice Road Industrial Estate,
Wallsend, Tyne & Wear NE28 6BY
Telephone: Tyneside (091) 2627507

Telex: 265871 A/B MONREF G
(Quoting Mag 70211)

A staggering 32 ROM images installed and accessible at any time

Included in the package is a utility ROM which has many useful features such as 'FICOPY', a clever file transfer program that transfers files between DFS and ADFS formats or vice versa.

So for less than the price of four external cartridges you get a MASTER BOARD "AA" which with twice the capacity has got to be **THE** ROM expansion for the serious MASTER user.

The unit comes with the usual Morley, full no-quibble twelve months warranty, and our usual after sales service

THE COMPLETE RANGE OF TELETEXT SOFTWARE from M/B SOFTWARE

*NEW . . . DESIGN 7 PLUS – now 'the best' is even better. Held in high regard by reviewers and hundreds of satisfied owners, DESIGN 7 has been further improved, with revised keystrip & even more features. Design/load/save and MODE 7 screen with ease, up to full CEEFAX/Oracle standard. Will convert ANY MODE 7 screen to a BASIC procedure, for inclusion in your own programs. ROM version includes a file copier, printer dumps useable from BASIC etc. B/MASTER/COMPACT.

TELETEXT EMULATORS/SCREEN DISPLAYS/INFORMATION SYSTEMS – A complete range of teletext programs to cater for all needs, with full teletext adapter interfacing.

*NEW . . . DESFAX – totally new version – streets ahead of the competition – run your own information/display system. Stores hundreds of screens on dual 80 track drives (96 screens on single-sided 40 track), with access to any screen with a SINGLE KEYPRESS. Lots of special effects – screens can scroll, slide, overwrite etc. Animation, loops, subroutines – send for details – not enough space here to even begin to describe the advanced features!! B/MASTER/COMPACT

*NEW . . . MASTERFAX – 84 MODE 7 screens in memory at once. 148 screens possible with cartridge RAM. An advanced teletext/carousel program featuring SINGLE KEYPRESS or 3-digit page selection. Runs entirely from memory – no disc accesses after pages are loaded. Superb animation and other effects. MASTER/COMPACT only.

*NEW . . . VU-FAX – 1000 screens and no disc accesses! Screens stored on MORLEY 1MByte RAM DISC. SINGLE KEYPRESS gives instant access to any screen (or emulate teletext). This is the ultimate MODE 7 screen management system – there is nothing else like it. MODEL B/ MASTER 128.

*ALSO . . . MASTERcopy – DFS/DFS, DFS/ADFS, ADFS/DFS, ADFS/ADFS file copier. Uses the MASTER 128's memory to the full to permit fast disc copying. 31 DFS files to ADFS disc in less than 2 minutes. Creates directories automatically. You will wonder how you ever managed without this program. Described by reviewers as 'unexcelled'. MASTER 128 and COMPACT's fitted with DFS ROMS.

ORDER FORM

To order simply complete and return by post enclosing your cheque/P.O. made payable to Morley Electronics, or by phone during office hours, quoting your ACCESS or VISA number.

Morley Electronics, Unit 3 Maurice Road Industrial Estate, Wallsend, Tyne & Wear NE28 6BY Telephone Tyneside (091) 2627507.
Telex: 265871 A/B MONREF G (Quoting Mag 70211)

ALL PRICES INCLUDE VAT @ 15%

			P&P Rate				P&P Rate
Qty. _____	Morley Teletext Adapters	119.95	(a)	Qty. _____	M/B Software Design 7+	9.95	(c)
Qty. _____	Optional Power Supply	9.95	(b)	Qty. _____	M/B Software Desfax	19.95	(c)
Qty. _____	Teletext Utilities on disc	5.95	(c)	Qty. _____	M/B Software DesROM	12.95	(c)
Qty. _____	1 Megabyte RAMdisc	199.95	(a)	Qty. _____	M/B Software Mastercopy Disc	12.95	(c)
Qty. _____	2 Megabyte RAMisc	349.95	(a)	Qty. _____	M/B Software Mastercopy ROM	14.95	(c)
Qty. _____	Eprom programmer V2	34.50	(b)	Qty. _____	M/B Software Masterfax	29.95	(c)
Qty. _____	Master ROM boards "AA"	45.95	(b)	Qty. _____	M/B Software VU-Fax System inc RAMdisc	249.95	(a)
Qty. _____	Master RAMdisc/SWR cartridge	P.O.A.		Qty. _____	5.25" Floppy discs x 10	7.95	(c)
Qty. _____	Care Master ROM cartridges	8.95	(b)	Qty. _____	27128 16k CMOS EPROM	3.65	(d)
Qty. _____	Master Smart cartridge	39.95	(b)	Qty. _____	Info Pack + Demo Disc of all Software	FREE	(c)

Please delete: Adapter software on **ROM/Sideways RAM format**/Software on **40/80** track disc

Name ______________________ Phone no. ______________

Address ______________________

______________________ Post Code ______________________

Cheque No ______________ Access/Visa No ______________ Amount £ __________

VISA

Please add Postage and Packing @ a=£3.00 b=£2.00 c=£1.00 d=£0.65 (when ordering more than one item, add P&P. on highest rate item only)
GOVERNMENT, LOCAL AUTHORITY, AND TRADE ORDERS WELCOME. Please allow 28 days for delivery

SPELL – MASTER

This is the first completely ROM based spelling checker in the world. As a result it out-performs all known spelling checkers on this machine or any other micro-computer. The single 128K EPROM contains over 59,000 separate words and 22K of program.

Compatible with all BBC Micros

Special switching techniques ensure that the 128K ROM appears to the machine as one single 16K ROM - this guarantees that it is completely compatible with the ROM sockets in all versions of the BBC Micro- computer.

Compatible with all the major word processors

SPELL-MASTER has been designed to fully integrate with the most popular word processors on the BBC, WORDWISE and WORDWISE PLUS, VIEW and of course INTER-WORD. While editing in these word processors all that is necessary to control SPELL-MASTER is to press one CTRL key (Usually CTRL-J). This causes a menu to appear listing a variety of options such as 'Check entire text', 'Check word at cursor', 'Continuous check - on/off' etc. Text is checked directly in memory while in the word processor. There are even short-cuts to the menu, for example, pressing CTRL-V in any of the above word processors will start checking the text immediately from the current cursor position. Compare this with the process of checking text in the most highly rated competitive product - VIEWSPELL.

VIEWSPELL	SPELL-MASTER
•Save text from word processor. •Enter spelling checker. •Load text into spelling checker. •Check the text. •Go back to word processor. •Load marked text.	•Press CTRL-V
•...finally, make corrections.	• make corrections.

Check entire text

In a word processor, SPELL-MASTER can check at up to 10,000 words per minute. Whenever a word is indicated as misspelt the user is given three simple choices. Replace the word with another selected from the dictionary, ignore the word altogether or add it to a user dictionary.

Check as you type

Because the dictionary is ROM based it is possible to check words as they are typed. This feature works with all the above named word processors and does not slow the operation of the word processor at all. Whenever an incorrect word is entered the computer will bleep; the word may then be corrected or simply ignored.

User Dictionaries

SPELL-MASTER supports extensions to the main dictionary in sideways RAM or ROM. This has the advantage that there is no speed degradation when checking against user dictionaries, since there are no disc accesses required at all. Once a word is added to a user dictionary it is treated as if it is present in the main dictionary.

SPELL-MASTER can support a number of separate dictionaries at once, each sideways RAM or ROM holding up to 3000 additional words. Once a dictionary has been created it can be 'burned' into an EPROM to form a permanent extension to the main dictionary.

Provision is made for editing any dictionary extension, for adding or deleting words in bulk, and directly loading or saving user dictionaries from or to sideways RAM.

Additional star commands

These can be issued from any language ROM such as spreadsheets or BASIC (they can even be included into BASIC programs). Some of the 8 commands are:

***CROSSWORD** - Will search the entire dictionary for words that exactly fit the search pattern. For example *CROSS. ##M#U#ER would list ARMOURER, COMMUTER, COMPUTER. It takes about 8 seconds to check against all 59,000 words.

***ANAGRAM** - Will list all the words in the dictionary that contain the same letters as those specified.

***FUZZY** - Will list all words that sound something like the one you are searching for. If you are not sure of the spelling of a word then entering the approximate spelling here will generally list the word you are looking for.

Price: £59.00 incl.

Upgrades

Owners of the older two chip versions of SPELL-MASTER can upgrade to the single chip version for £25.00. However this new version is functionally equivalent and so it should not be necessary to upgrade.

2nd processors

Due to its unique design SPELL-MASTER will not work with word processors running on the 6502 2nd processor, although there are facilities provided for checking long text files.

VISA

Computer Concepts

Access

Gaddesden Place, Hemel Hempstead, Herts HP2 6EX Telephone: (0442) 63933

Palace of Magic

S	G	P	V	O
5	8	8	8	8

PALACE of Magic is the latest in a long line of arcade adventures from Superior Software. It's similar in many respects to one of Superior's earlier releases called Citadel – in fact I began to wonder why it wasn't called it Citadel Two.

The scenario is quite simple. You have offended an evil wizard called Caldeti who has turned you into a dwarf and banished you into the Palace of Magic. Your task is to search for a transporter, your only means of escape, which is hidden somewhere in the 100 screens which make up the Palace and the lands surrounding it.

You can move left and right and can jump up to twice your height to get over some obstacles. Ropes and ladders are also available to help you in your plight.

Scattered about the Palace are lots of coloured bases, some of which have keys or other useful objects sitting on them. You can only pick up or drop objects while you are standing on these coloured bases and you can only carry two objects at any one time.

The keys are colour coded and are necessary to open the similarly coloured gates which bar your way around the Palace.

Your task is made a lot harder by the fact that you are not the only living creature – the place is crammed full of unusual and nasty monsters who are out to get you. If you bump into any of these, they drain you of energy. If you lose all your energy, you die.

Fortunately, you are able to restore yourself by finding and absorbing energy which for some strange reason is stored in magical top hats.

The maze is complicated and the puzzles are challenging but not impossible. Some of the solutions are so obvious once you've discovered them. The graphics are quite good and most of the objects look like what they're supposed to be, which is a big help when it comes to figuring out where the objects should be used. There isn't a lot of sound in the game, but the game doesn't require much.

The only real criticism I can make about this game is that it has no Save facility. I found with its predecessor, Citadel, that once I had figured out a large number of the puzzles it could take around two hours to play the game up to the point where I could try something new.

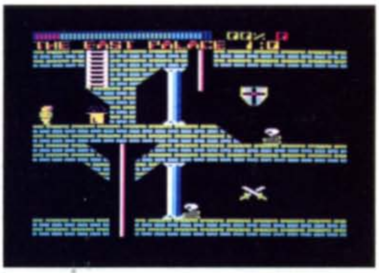
I have to admit to being an avid arcade adventure fan. I still haven't solved all the mysteries of the Citadel and I know there are a lot of people in the same boat. Now, with the Palace of Magic to escape from as well, I foresee many more late nights of problem solving for a lot of adventurers.

Desmond

Programmer's Profile

Palace of Magic was submitted to Superior Software by Martyn Howard, an 18 year old from Surrey. Interested in writing quality games and utilities, his ambition was to have a game on the market. With Palace of Magic he has achieved his goal.

PALACE of MAGIC
SUPERIOR SOFTWARE
ACORNSOFT
Compatible with the BBC B, B+ and Master Series computers
BBC Micro and Master Series 5¼" Disc £11.95



Price: £9.95 (cassette), £11.95 (5.25in disc), £14.95 (3.5in disc)
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX.
Tel: 0532 459453

Suds

S	G	P	V	O
7	8	9	10	9

TELEVISION these days seems congested with soap operas. Whether it is a simple British offering in the mould of East Enders, a dire Australian attempt like Sons and Daughters or an elaborate American extravaganza such as Dynasty, whenever we switch on, we get the continuing story of such and such.

I suppose it was only a matter of time before these "everyday lives" found their way into computer adventures. Suds is unashamedly a direct spoof on the four major British soaps: Emmerdale Farm, Coronation Street, Cross-Roads and East Enders – only the names have been changed to protect the innocent!

The adventure loads in four parts, though you don't need to complete a part in order to progress to the next – however, each section is undoubtedly more difficult than its predecessor.

You are required to negotiate the puzzles of Emeroyd Farm then catch a train to the mean streets of Manchester and the perils of Abdication Street.

If you successfully overcome the traps of the TV studio, the Cross-Eyes motel looms where the mad arsonist awaits you. Finally – if you haven't finally lost your sanity – who knows what the fabled land of the Dead Enders has in store for you.

I have now completed the Emeroyd Farm section and have made major inroads into the three other parts of this mega-game, and life is becoming complex beyond imagination – after all isn't that what Soap Operas are all about?

The puzzles in part one, although logical in retrospect, are ingenious and riddled with superb puns. For instance, upon climbing a tree I discovered a herring which I duly smoked over a War Women's camp fire. Hey presto – I had a red herring. However, this was a red herring with a particular use which I will leave you to discover.

Later in the adventure I had to pour a bucket of cement over some relatives who were blocking my path to the next section – the result was to CEMENT RELATIONS.

The Black-Pudding bomb in Abdication Street is something else, and I don't think Equity would be too pleased to discover its purpose: You'll need some tripe to muffle the blast.

A skeleton will provide a key to succeeding at the Motel, where the problems have had me scratching my head for nights on end. Meanwhile, the Dead Enders have quite a few surprises awaiting even the most experienced of adventurers.

This is a truly addictive adventure which requires as much thinking and planning as key tapping. The humour is refreshing and something in the mould of What's Eeyore's? or Locks of Luck.

American Suds is now in production with an Australian version to follow. In the meantime, I suggest you go out and buy Suds immediately.

Pendragon

Price: £4.00
Supplier: Riverdale Software, 95 Printon Avenue, Manchester M9 3JW.
Tel: 061-795 4549

G: Graphics
P: Playability
V: Value for money
O: Overall

Ransack

S	G	P	V	O
8	9	8	8	8

IT seems just yesterday that I was enthralled with Peter Scott's Omega Orb. Like an old friend, Mr Scott is back again with something resembling a space hopper on a pogo stick.

However, Al is not your average toy, but an artificial life-form – terms like robot and android having long since been banned on the grounds of mechanical discrimination.

Initially, he's just armed with a front firing laser but has the ability to collect a myriad of different weapons including four types of smart bomb and six types of laser.

The scenario is a good old shoot-'em-up, with plenty to shoot at. On my pre-release copy there were 44 different aliens with 200 attack patterns, all spread over eight massive planetscapes. Each planet. (named after a popular arcade game) is no less than 104 screens wide, giving a total of 832 action packed screens.

At the end of each level you are awarded a bonus screen. It is possible to bounce on the alien space ship while shooting at the baddies, but I have not managed it yet.

The scrolling landscape moves at devilish speed and you'll have to practice before you see the end of each level.

What makes Ransack so challenging is a feature that is very easy to miss when you first play the game, especially when like me, you don't read the accompanying instructions.

The landscape of this game is not just scenery – It's a hazard. As you bounce along, quite merrily blasting away at every mild mannered alien in sight, you might fail to notice the sudden appearance of electified spikes, which have quite a shocking effect on Al's energy level.

These spikes can be neutralized by a certain type of smart bomb – you will have to discover which one for yourself. The problem with smart bombs, and other armament for that matter, is that they fly through the air, along with everything else and are likely to be destroyed by a stray laser bolt – so beware.

The sound employed by Ransack is just what you'd expect from this type of game, with lots of atmospheric pops, bangs and whizzes. While the title tune sounds very familiar, it's unusual and witty.

In conclusion, this is one for every collection. Now, where did I put my multi-function, ultra-cluster, auto-sighting, hyper-laser-ranging pogo stick . . .

Guilder

Price: £7.95 (cassette) £11.95 (disc)
Supplier: Audiogenic, 12 Chiltern Enterprise Centre, Station Road, Theale, Berkshire R97 4AA.
Tel: 0734 303663

Brian Jacks Superstar Challenge

S	G	P	V	O
7	3	6	7	6

BRIAN Jacks Superstar is a re-release of an old favourite which first appeared a couple of years ago. The only change is the price which has now dropped to a budget £1.99.

The aim of the game is to beat Brian Jacks (Mr Superstar himself) in eight different events of the kind that were featured on the old TV programme. Event number one is swimming and here you must coordinate left and right arms (Z and X keys) with breathing. Once mastered, it is no problem to beat Brian who swims in the other lane.

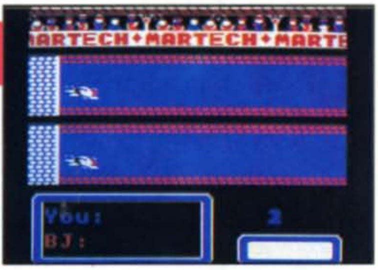
The next event also has a watery theme – canoeing. To succeed in this requires several hits of X to move the paddle one way followed by several hits of Z. Once again, Brian is in the other lane and is relatively easy to beat.

Next comes archery. Here you must hit a moving target, allowing for wind drift. A plan view shows you and the target and you can adjust elevation and shot. A front view of the target shows where the arrow hits. You have six arrows in all and I have not yet beaten Brian who does not visually compete – he just gets a score.

We now move to the track for the cycling which requires Z and X bashing and gear changes. Once again, Brian is not that fast and is easily beaten. The same is true for the 100 metres run. In both these events Brian is shown competing in the other lane.

Events six and seven are gym tests. First, the squat thrusts which are a Brian Jack's speciality. To complete a successful thrust, several hits of X and then Z are required. You'll be hard pressed to beat the master at this one. The arm dips require similar Z and X work to get up, followed by Return to drop. Brian is not so hot at these and he's easily beatable.

The final event is football skills. You must dribble a ball through a slalom course, reach the penalty area, then position a cursor in the goal to indicate where you wish to shoot. A diving goalie will attempt to save it. You have three attempts at this. Again, Brian does not appear in this event but gets a score anyway.



Like a number of these sports simulations, there are good, ordinary and poor events. In this case, the football is very poor – the animation is painfully slow. You have to complete the test to move on to round two (the same events again) but I rarely have the patience to do it.

It really spoils the entire software in which the gym test events are particularly good.

Rog Frost

Price: £1.99
Supplier: Ricochet, 8-10 Paul Street, London EC2A 4JH.
Tel: 01-377 8411

The Puppet Man

S	G	P	V	O
9	8	9	10	9

THIS is Geoff Larsen's fifth adventure and goes far to confirm his mastery of the genre.

The Puppet Man is one of the most original and engrossing adventures I have seen for a long while, and must be Geoff's finest offering yet.

At the end of the last century there lived a puppeteer whose plays were the talk of the land. In fact his puppets were so life-like that it was even rumoured that they were little people, disguised as puppets.

The Puppet Man is due to perform at the village of Owlsmore's midsummer fair – but the day before, his star marionette is stolen or mislaid.

During a dream you are visited by Mnemosyne, the mother of the Greek Muses. She tells you that if you can help three of her daughters, the muses of dance, comedy and poetry, they in turn will assist you in a search for the marionette.

The adventure becomes a trilogy of inter-related plots in which you first help a ballerina, then an auguste clown and finally Pierrot.

The backdrops incorporate 19th century theatre and circus themes giving the whole adventure the heady atmosphere of vaudeville. The puzzles are complex but totally logical and require careful thinking and backtracking.

The beginning reminds me of Level 9's Worm in Paradise and Robico's Myorem. To be compared even in part to those two masterpieces must be sure testimony to the quality of this adventure.

Later in the bash is a beautiful scenario involving a butcher, a baker and a candlestick maker – and a wooden tub. Another scene involves trapping a bear, while on the stage is a struggling Covent Garden escapologist!

As suggested, the adventure involves dancing, comedy, poetry and sleight of hand, and like all Larsoft adventures is totally non-violent.

The multi-use of each location and the facility to TALK to the characters you meet, means that Geoff has used the Quill to good effect.

This adventure really is superb and you will be hard pressed to find a better release for the price. Larsoft is a name worth watching. All I can say is – buy it: You won't be disappointed.

Pendragon

Price: £3.95 (mail order only)
Supplier: Larsoft, 4 Chantry Road, Clifton, Bristol BS8 2QD.

Star Clash

S	G	P	V	0
7	8	8	10	8

WRONGLY accused of a crime he did not commit, the Emperor is forced to flee the galaxy. You have been assigned the post of imperial bodyguard: Your duty is to protect the Emperor's star cruiser from the unwelcome (and usually violent), attentions of galactic customs officials.

STAR*CLASH
BBC
GREMLIN
BBC

Star Clash is a game which is very much in the Elite mould, a fast moving, vector graphic shoot-'em-up. Forget the trading, the drug smuggling, the bounty hunting – just get out there and blast.

The Elite style is maintained through the inclusion of an identical three dimensional radar display. This enables you to pinpoint the position of both the customs ships (white dots), and the star cruiser (a purple dot).

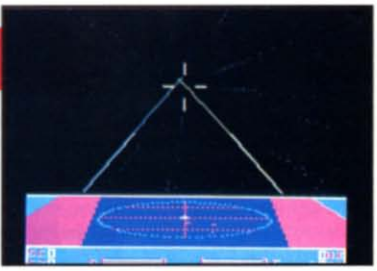
This purple dot is very important as it is all too easy to get wrapped up in your own dogfights, and forget the Emperor. The first indication that all is not well is a flashing screen and the sound of gunfire. This is the time to rush to your master's side before he, and the game, is terminated.

Decelerating from warp speed as you approach the star cruiser you will see pulses of laser energy being fired by the customs ship. The cruiser manages to avoid some but those which strike home do so with a shower of sparks and flying metal.

Your ship fires two laser bolts which converge as they shrink into the distance. The inaccuracies become apparent when you fire a shot and then move the joystick: Instead of following its initial trajectory the laser pulse moves with the gunsights – hardly a major failing but irritating.

Progress is measured by how many star gates you pass through. A star gate is a hyperspace portal through which you jump to another galaxy. Unfortunately, each gate is heavily defended by a squadron of trigger-happy customs officials.

A parade of attackers is displayed in a demo routine at the start of the program. These are rotated through various axes and their points value shown on the screen – though some won't be encountered until the higher levels. The one ship that is not displayed is the star cruiser. The easiest way to identify this is to blast every ship you meet during the first game – the star cruiser was the last one you shot before the game ended.



The instructions provided are sparse, giving no explanation of the instrument display. This wasn't too disastrous as the white on cyan instrument panel was practically invisible on my humble colour monitor.

Star Clash is a very enjoyable, budget-priced trip around the universe with a hefty helping of zapping thrown in for good measure.

Nev Astly

Price: £4.99 (cassette)
Supplier: Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.
Tel: 0742 753423

Megarok

S	G	P	V	0
6	6	6	6	6

LENNY Morgan is a spaceship pilot with a soft spot for aliens. His kind hearted disposition earned him a court martial and two years hard labour on a penal colony. Rock breaking 23rd century style involves sitting in the middle of an asteroid field with a mining laser and a lot of concentration. Megarok is a budget version of the early Acornsoft hit Meteors, the term budget applying to both cost and quality.

One of the most appealing features of the original game was the graceful and effortless way the asteroids and spacecraft floated around the screen. Megarok's characters move far too quickly and erratically. Spaceship rotation is an ideal example: The ship rotates jerkily through eight compass points, unlike the smooth pixel by pixel arc described by the Meteors craft.

The duration of the game is not governed by a set number of lives – you have one ship and a fixed amount of energy. Every collision with an asteroid drains your energy reserves, the amount lost being proportional to the size of the asteroid struck. You may lose up to 20 of your original 100 units in a single collision, so it is vital that you realise the importance of your shields. Use of the shields expends one energy unit and provides five seconds protection, a worthwhile trade at the start of any screen.

Price: £1.99
Supplier: Bug-Byte, Victory House, Leicester Place, London WC2H 7NB.
Tel: 01-439 0666

Firepower is supplied in the shape of twin laser cannons, but despite this seemingly awesome potential you will still have difficulty destroying the rocks. Many shots which appear to strike home have no effect, especially when firing across the path of an asteroid. This dodgy collision detection does work in your favour from time to time you, close your eyes and wait for the crash of an imminent collision, only to find that the rock passes straight through the ship!

The secret of success in the original game was to stay as still as possible and blast the boulders as they drifted towards you. Dabbing the thrust key resulted in gentle and controlled acceleration of the ship. Dab the thrust key in this game and the beast engages turbo boost, darting around the screen hitting all and sundry.

After a short while it begins to decelerate, but the damage has already been done. The retro key will stop the ship dead, but the chances of locating it while in a state of blind panic are small.

Megarok's two player option is pretty original: Controlling one ship each you play simultaneously – shackled together. All controls work as before, but the direction in which you travel is a result of your individual directions and speeds. Should one of you bite the dust, there is a short pause before the game resumes for the surviving player.

BBC 'B' & MASTER
MEGAROK
BUG-BYTE

From screen four onwards some of the rocks will fire crystals at you – catch the white ones and dodge the rest. Despite the £1.99 asking price I can't recommend Megarok: Put your money towards one of the Acornsoft/Superior compilation tapes and play the original Meteors.

James Riddell

S: Sound
G: Graphics
P: Playability
V: Value for money
O: Overall

The Living Daylights

S	G	P	V	O
5	6	5	5	6

HOT on the heels of the new James Bond film The Living Daylights is the computer game of the same name. It was with some trepidation that I loaded up the game – I still have nightmares about View to a Kill.

The game follows the exploits of James Bond as he fights his way through eight separate scenes from the film. These are stored as three files on the flip side of the cassette.

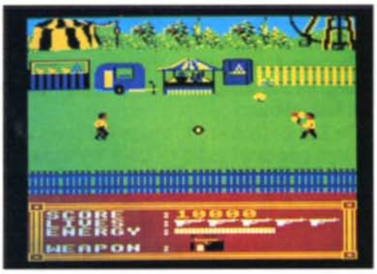
Each scene consists of a series of adjoining screens – these are traversed by running from left to right. You have control of Bond's gun sight – when it is on the screen Bond can shoot, move it off the righthand edge and Bond will run.

Episode number one takes place in Gibraltar. You are involved in a mock battle with members of the S.A.S. – they pop up from behind bushes at regular intervals, but have very little to do with the game.

Keep running until you meet up with the KGB agent... then kill him. I had major problems at this point – the Ruski just wouldn't die. In desperation I decided to read the instructions:, and found I'd been running around with a gun which fired paint pellets. A quick visit to the armoury soon rectified the situation and the Ruski bit the dust.

With the completion of each scene you are given the opportunity to choose a special weapon from Q's workshop. Only one of the four on offer will be of use in the next scene.

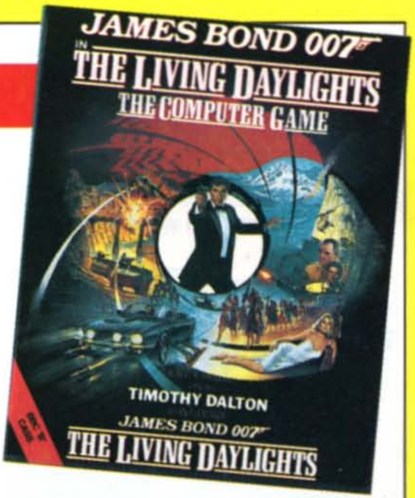
Price: £9.95 (cassette) £12.95 (disc)
Supplier: Domark, 204 Worple Road, London SW20 8PN.
Tel: 01-947 5622



Scene two involves running down a street while avoiding bombs dropped from a helicopter. The bombs are easy to dodge but the resultant craters are a hazard and must be jumped. The best way to do this is to hold down the jump key continuously – Bond skips merrily down the street, leaping all obstacles.

Running and jumping is the order of the day again in scene three. Race through the factory amid a shower of falling pipework, while at the same time hurdling numerous barriers. It's during sections like this that you notice how little control you have over Mr Bond. Trying to stop short of a falling pipe is nearly impossible – even when you've released the movement key he still takes two more steps.

Once file number two has loaded you are ready to play scene four, The Mansion. This is one of the trickier levels, a mixture of running, ducking and shooting is required if you're to survive intact. The enemy agents are disguised as milkmen and armed with exploding pintas.



The fairground is the setting for scene five. Innocent looking toy balloons cause Bond a major headache – quick and accurate shooting is essential.

I never completed the remaining three screens, more through lack of enthusiasm than lack of skill. The mediocre graphics and animation are matched only by the boring, repetitive, gameplay – it looks like the nightmares will continue.

Carol Barrow

Rik The Roadie

S	G	P	V	O
6	8	8	10	8

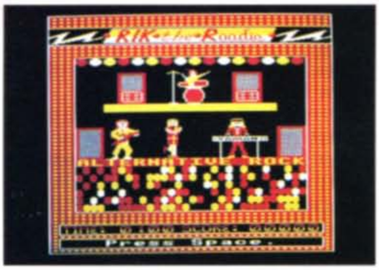
AS Rik, the roadie for the top pop group Alternative Rock, you have quite a problem on your hands. Their next concert is due to start in just six hours and you have all the gear in the van 160 miles away. First you've got to make the motorway dash, then move all the amps into the hall and finally set the correct sound levels on all four channels.

The first stage, the drive, is effectively a motor racing game. A plan view of the road is shown with large, brightly coloured cars. The usual alternate coloured road edging is used to generate a good impression of speed. The sound effects are quite pleasing but can be turned on or off at any time.

You need to travel fast because of the six hour limit, but the entire roadway is cluttered up with drivers who are presumably out for a Sunday afternoon potter. It needs careful use of accelerator and brakes to be able to weave a course between them. At times, the route ahead seems completely blocked. You must then slow right down to allow the dithery drivers to sort themselves out.

After about 100 miles, driving fatigue (or is it screen watcher's tiredness?) sets in. This can result in many more accidents each of which puts half an hour on the clock. It is worth travelling more slowly to avoid crashes. Alternatively, you can do what every good driver should do – take a rest. The game has a pause facility which will not cost you any time faults.

Price: £1.99
Supplier: Alternative Software, Units 3-6, Bailey Gate Industrial Estate, Pontefract, West Yorkshire.
Tel: 0977 797777



When your journey is finally completed, the scene changes and a moonlit, star-spangled sky provides the backdrop to your attempt to shift the equipment. In fact only three items need to be moved, and to achieve success you must hit two keys to control Rik's left and right feet. Pure speed on the keys is no good for this – care and coordination are required.

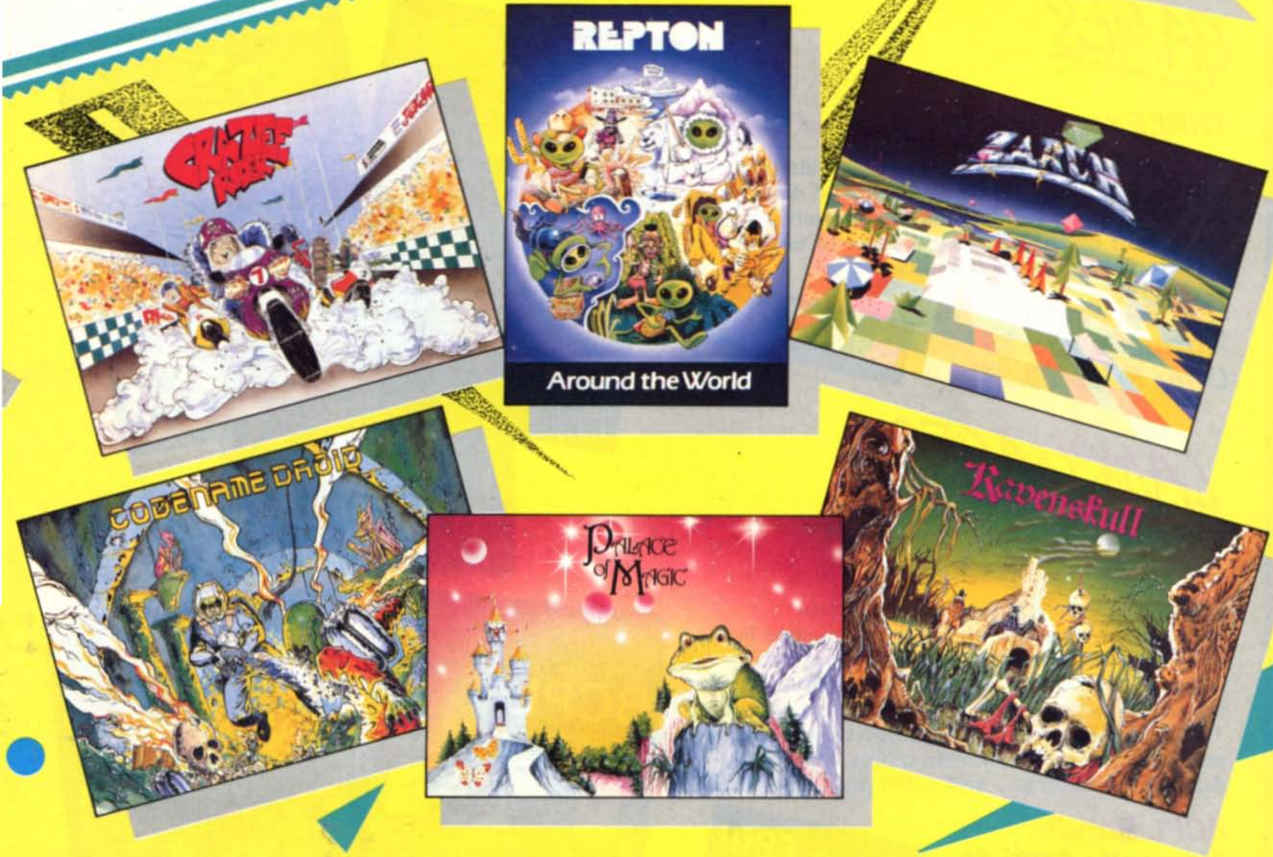
To set the sound levels you must ensure that four meters are kept in the red area. Too low a level will mean the audience won't hear the concert, but too high is worse as fuses will blow.

If you complete the three tasks within the six hour limit (about six minutes real time) You are rewarded with a display by that fab group Alternative Rock.

Alternative Software has released a number of games for Acorn computers in recent months. Rik The Roadie is the best I have seen. The graphics are neat and interesting, and the various sections of the game, which all require different playing skills, are well linked by an unusual theme. I look forward to more programs of this quality from the alternative people.

ALTERNATIVE
RIK
THE ROADIE
ELECTRON/BBC
199 RANG

Rog Frost



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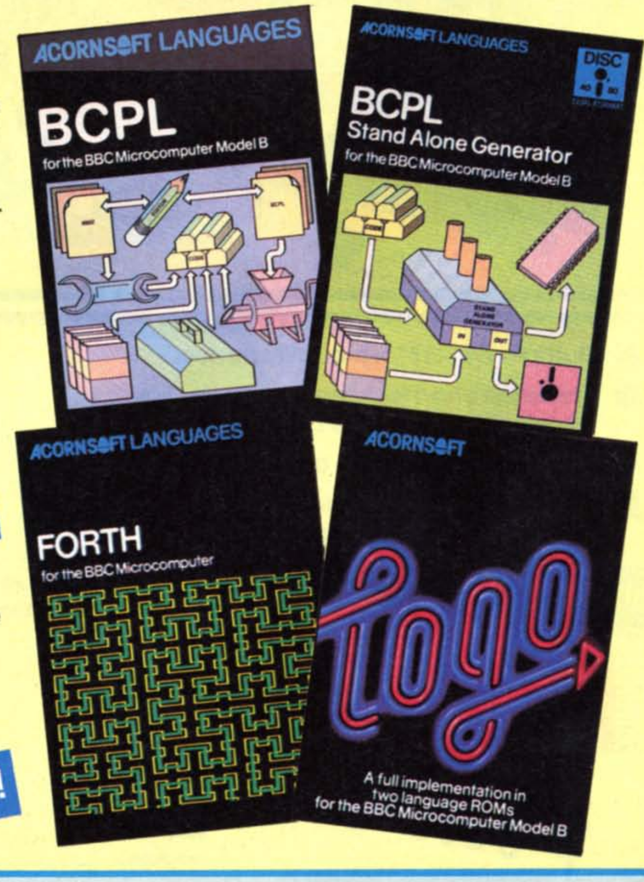
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MUSIC

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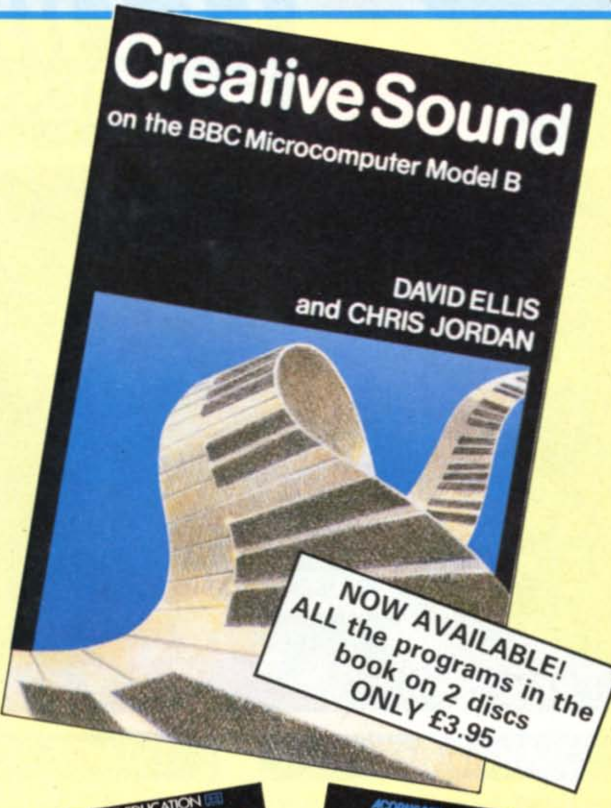
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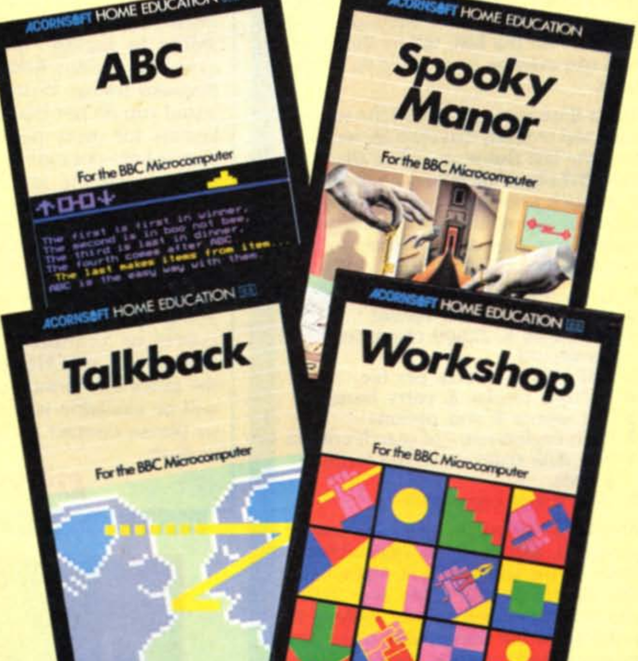
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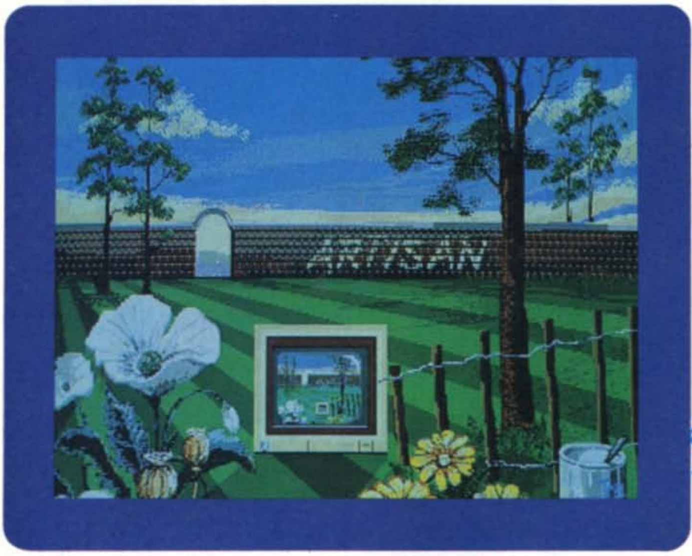

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Here's looking at View

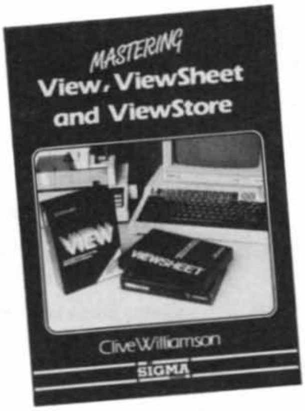
Rory McClory reviews two books devoted to View and associated products

HOW many BBC Micro users have been tempted to try word processing but their View roms remain unpaged? Yet it is possible to learn the fundamentals of View within an hour or two and become proficient after relatively few sessions.

The Acornsoft View Reference Guide won't help you to learn how to word process, and until now we have had to make do with Acornsoft's Into View, which is okay as far as it goes.

Fortunately, two books have been published recently either of which will improve your understanding of View and the related family of View products.

Apart from View, the books cover somewhat different ground. The contents have been summarised in Table I to help you decide which is more appropriate for your requirements. The main difference is that Clive Williamson's book has major sections dealing with ViewSheet and ViewStore and therefore will appeal to users wanting to use and integrate these members of the View family.



A Dabhand Guide
VIEW
VIEW
DABS PRESS

Product: Mastering View, ViewSheet and ViewStore by Clive Williamson
Price: £12.95
Supplier: Sigma Press, 98a Water Lane, Wilmslow, Cheshire SK9 5BB.

Product: A Dabhand Guide – View, including ViewSpell and ViewIndex by Bruce Smith
Price: £12.95 Programs Disc, 5.25in DFS £7.95, 3.5in ADFS £9.95
Supplier: Dabs Press, 76 Gardner Road, Prestwich, Manchester M25 7HU.
Tel: 061-773 2413

Perhaps his title Mastering... is misleading nowadays. Indeed, one of my colleagues decided not to buy it because he thought, mistakenly, that it dealt only with View on the Master and he had a model B. Bruce Smith's guide concentrates almost entirely on View and only includes the close relations ViewSpell and ViewIndex.

Contents	**Number of pages**	
	Williamson	**Smith**
View	70	113
ViewSpell	1	12
ViewIndex	1	6
ViewSheet	30	0
ViewStore	51	0
ViewPlot	0.5	0
Integrating View family (OverView)	23	2
Introduction to computing	13	2
Printers/printer drivers	17	12
Appendices	0	35
Index	3	12

Table I: A comparison of contents of the two guides for View

Both books concentrate on the current version, View 3, but give detailed descriptions of the earlier versions, View 1.4 and 2.1. In this respect, the problems of describing commands which differ in the three versions are best dealt with by Smith, who confines the differences between the versions to an appendix. However, Williamson clutters up his text by describing the differences as they occur and this could be very confusing for the novice.

Computer beginners reading Mastering View have a 28 page preamble on shadow memory and different disc filing systems, but those interested on getting to grips with View should turn to page 30. From there Williamson goes on to cover all aspects of View in a straightforward, but unimaginative, fashion.

His coverage of View printer drivers is brief and ViewSpell, ViewIndex and ViewPlot get hardly a page each. The instructions for Viewsheet do not represent a significant advance over the Acornsoft manual but if you have a Master or Compact they are better than the abbreviated instructions in the Welcome Guide.

I find ViewStore fairly complicated and the manual is little better. I was pleased to find that Williamson gave some useful examples but he probably does not provide enough information for more advanced ViewStore users.

I think it is much easier to appreciate the *What You See Is What You Get* nature of View on a monitor – and this is

Turn to Page 40 ▶

◀ *From Page 39*

Bruce Smith's approach. Smith brings a depth of understanding to View which should appeal to both novice and regular user.

His descriptions of the Number Registers are clear and he provides some very useful !BOOT files and original function key definitions. For users still in the dark over printer codes, Smith's section on printers will shed some light.

The only utilities that Williamson offers are a program to set printer typestyles (not a printer driver) and a machine code patch that allows View 2.1 to capitalise on the extra memory freed by the presence of a shadow memory. A whole range of View utilities are listed in the Dabhand Guide (Table II) and it is well worth purchasing the accompanying disc to save hours of typing.

The disc comes with its own 13 page guide which deals primarily with the Printer Driver so it is essential to have the Guide book to make full use of the utilities, some of which are more useful than others. My favourite is the Screen Layout Driver, which allows you to see a picture of the layout of each page of text.

The screen for the View Manager is attractive, but I do not find this type of menu system saves much time. The view recovery utility can recover your text after you have mistakenly typed a NEW (or *WORD in View 3) but beginners will have to contend with *DUMP, memory bytes and *SAVE.

If you want a good manual for View buy the Dabhand Guide and disc, but if you want a guide which covers ViewSheet and ViewStore as well have a look at Clive Williamson's book.

Printer Driver Generator
Ready made printer drivers (Epson FX80 and Citizen 120D)
Screen Layout Driver – provides a 'printed' layout on screen
Recover – allows you to recover text after NEW
File Checker – compares the contents of a file with memory
Highlight Checker – shows you all text between highlights of same type
View Help – *HELP for View
View Manager – a 'front end' to View
    Excat: an extended catalogue system
    Template: an easy selection of dummy template files (standard pages)
    Precis: a brief description of files on disc (up to 255 characters)
    Load Text

Table II: Utilities from the Dabhand Guide

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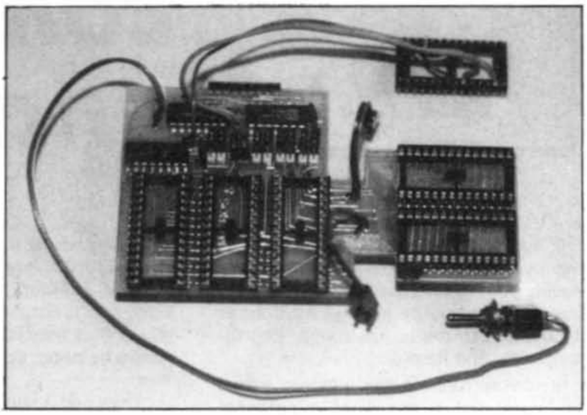


ONE reason I moved up-market to a Master was to rationalise the add-on boards that were sprouting out of my ageing BBC Micro. Of course, it was only a matter of time before enterprising companies would tempt me with hardware additions to the Master.

The latest offering from Vine Micros is the Romboard 4, which fits inside the Master and can carry four roms. However it is a rom extension board with a few differences. The two pairs of rom sockets available on the board can be configured to overlay the cartridge sockets or the ram areas. There is also a read/write protect switch for the Master's ram memory.

The small board is well made and has fly leads to two connectors and a 28-pin header which pushes over the right-hand end of 40-pin IC20. Following the single page of fitting instructions, I fitted the board within minutes – installation should present no problems to anyone used to plugging in roms.

Note that the notches on the roms face north in the vertical sockets and west in the horizontal sockets. Rom socket 8 (IC27) lies underneath the board and so cannot be changed without removing the board. By the same token, large piggyback roms such as Interword cannot be used in socket 8, although they will fit on the Romboard. Socket 7 (IC37) is used to plug in the board and is copied on the board itself.

It is compatible with all the co-processors, internal modems and Econet. There is no on-board buffering but I found no problems in using 8k or 16k eproms.

Before switching on, you have to decide whether the roms on the board are to overlay the cartridge sockets or the ram memory. The board is fitted with ten links, each of which can be set in either of two positions (North or South) with the familiar shorting connectors.

The links are all set very close together and I found it fiddly and hard on the nails trying to alter the links. I wish Vine Micros had fitted a row of dip-switches instead of the links, especially since you may want to alter the configuration of the rom and ram even when you are not fitting new roms. The overlay options are shown in Table I and require at least two or three links to be altered for each option.

If you are prepared to lose the use of one or more cartridges, or some ram, you may gain up to four internal rom sockets. If you rarely change roms and don't want removable cartridges accessable to tampering by the user – such as in a school or college – then Romboard 4 may be a good buy. However, the price of the board is more than the cost of two cartridges.

I find the 64k ram a useful feature of the Master but if you want these pages of memory overlaid by roms then the Romboard could offer you two extra sockets. By setting link connectors 19 and 18 to the East position in a normal Master you can use 16k or 32k roms in sockets 5 and 7 (IC37 and IC41). Inserting a single rom (nowadays the majority are 16k in size) into one of these sockets you lose the use of 32k ram.

The Vine Romboard allows you two sockets in exchange for a 32k ram bank, and providing you are using 8k or 16k roms you can use all the sockets the Master allows. There are intermediate options selectable by the link connectors which may suit some users and these are shown in Table I.

I'm hanging on to my ram and sticking to cartridges for the time being, and it's unreasonable to buy this board just for the ram read/write protect switch.

Number of cartridge rom sockets	Number of Romboard 4 rom sockets	Number of main board rom sockets*	Size of ram available
4	4	0	nil
0	4	0	64k
0	4	2	nil
2	4	0	32k
0	2	0	32k
2	2	0	64k
2	2	1	32k
2	2	2	nil
4	2	0	32k
4	0	0	64k
4	0	1	32k
4	0	2	nil

* The main board rom sockets refer to socket numbers 5 and 7. Socket 8 is always available and unaffected by these options.

Table I: Romboard 4 rom/ram overlay options

Product: Romboard 4
Price: £29.95
Supplier: Vine Micros, Marshborough, Near Sandwich, Kent CT13 OPG.
Tel: 0304 812276

by
The
Mad
Hatter
10/6

Red herrings, compatability and hobbits

THE bulk of this month's offering is written by you, the reader. I really enjoy having your letters, comments, tips and queries because the average adventurer who writes to me is intelligent, courteous, witty and helpful.

It makes running this column a real pleasure; but if you want a personal reply from me do please enclose a stamped addressed envelope – Also exercise a little patience!

To provide space I have had to hold over the conclusion to my Emerald Isle solution until next time.

Andrew Hunt from Tasmania reckons this is one of the best adventure columns he has seen (flattery will get you anywhere): At the same time he raises a couple of matters to do with Twin Kingdom Valley.

The uniform in the Desert King's castle: Is it a red herring? All I can say is that when I wore it, I found it made little difference to the way I was attacked in the castle. Certainly the Forest King's daughter would probably not like it; so I decided it was a red herring. Anyone know better?

Similarly, Andrew wonders if there is a way of removing the diamond ring from the dwarf short of murder: I think not, so prove me wrong if you can.

The Elf (G.I. Powell) is desperate for a copy of Acheton, as are several other correspondents. Does anyone know where they may have ended up? The Elf runs a helpline, so perhaps you can help him.

I have had a second, most interesting, letter from Richard Entwistle about the Mines of Moria and the problems experienced by Pedro Leonardo.

Richard confesses he is working from memory: He has upgraded to a Master and thus can no longer play The Lord of the Rings.

As an aside, I get rather irritated by these compatibility problems: Whose fault is it really? Is it that of programmers who won't stick to legal calls or else use over-elaborate protection; or is it Acorn who won't stick to standards initially laid down.

Anyway, Richard's thesis is this: At the start of part 2a you need to become two hobbits, such as Merry and Frodo.

When you get to *West of a lake* (two or three locations west of Moria's gate) tell Merry to go E; become Merry and examine the door. Save here.

Next become Frodo, light the candle and go E: Say Friend to the door and enter Moria.

Having saved this end position load it into part 2b of the adventure and then look to see whether any of the party (bar Gimli) are missing. If they are, return to part 2a and try again from the saved position made just outside the door.

Richard says that when you start part 2b there is another bug: Gimli disappears and is replaced by assorted objects (mithril armour and things like that) which cannot be manipulated.

Further into the adventure go E, E, E, U, E from the stone corridor and Gandalf will not let you leave.

Keep the door open until the orcs enter then go E and close the small door. After this go E again and you are back on track.

Another hint Richard gives is to wait after each move until you are beyond the second maze; otherwise you will leave the other characters behind.

Actions that help to deter the Moria bug include keeping Frodo well away from the strip of dry ground beside the door as much as possible and avoiding the slimy tentacles which attack when Frodo is present beside the door.

Pedro's experience of being *nowhere* is what happens when you become a character who is not present in the sec-

Problem Corner

In Micropower's **Wizard's Challenge**, Nick Musselwhite can't stop bleeding to death: What action should he take?

What's the password to get into the nightclub in **Melbourne House's Dodgy Geezers?**

Mark Turner has some queries. **Blue Dragon:** How do you pass the wizard at the bottom of the beanstalk after collecting the urn? **Firien Wood:** How do you survive the blizzard at the bottom of the chasm? **Franklin's Tomb:** Star trouble – where or what are the paper and wooden stars, which star is the Morning Star weapon?

Countdown to Doom: How do you escape the metal dome with the rod once the computer has started the countdown? (None of the solutions sent to me mentions either a rod or a dome – I don't have the game myself). How do you stop the floating platform in the engine room? I'm sure the marks on the town wall after the sandworm ride are just scenery.

Tony Marter wants to put an end to his problems in that superb game **Gateway to Karos**. He scores 1518/1700, but can't find a use for the magnifying glass, the inscribed metal plate, the empty bottle and the purple fruit.

Tony's no beginner, so I'm sure he's tried drinking from the bottle after filling it in various locations and maybe the fruit should be fed to something.

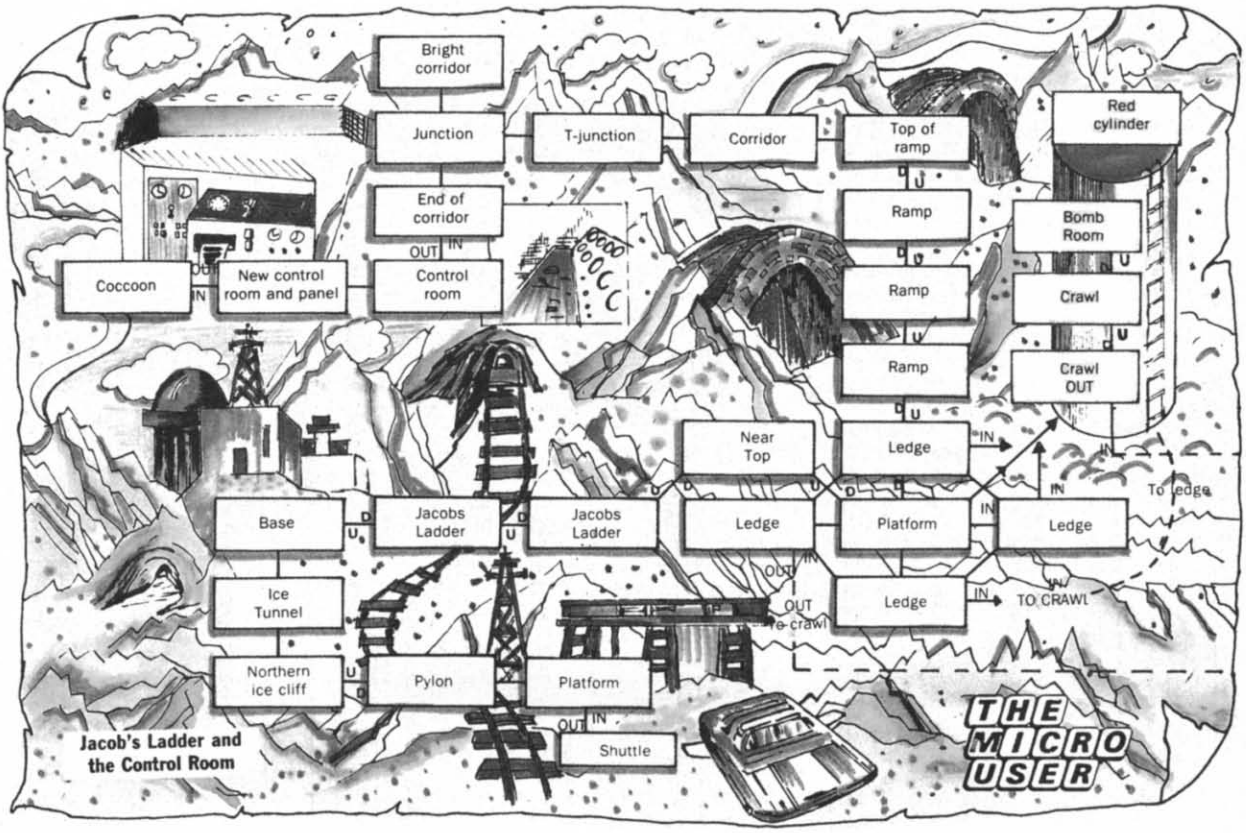
Unfortunately I've not played Karos since Adam was a lad and my map doesn't tell me what Tony should do.

He's missing one treasure, but has the ivory statue, silver horn, opal studded bowl, golden harp, blue gem, crystal ball, silver dish, silver star, magic carpet, mirror, casket of jewels, golden cup and the carry-all bag.

So what and where are the questions that Tony needs answering. He's bursting to go on to **The Price of Magik**.

Nick Fox is stuck in **Kayleth** – he'll find the early moves in our July issue.

Mark Outten wonders how to use the kitten in **The Temple of Vran (Ket Trilogy part two)** and is stuck once more in Old Father Time. He feels sure he needs the coins to free the dwarf – is he right?


Bright corridor
Junction
T-junction
Corridor
Top of ramp
Red cylinder
End of corridor
OUT
IN
Coccoon
IN
OUT
New control room and panel
Control room
Ramp
U
Ramp
U
Ramp
U
Bomb Room
U
Crawl
U
Crawl OUT
Near Top
Ledge
IN
IN
To ledge
Base
D
U
Jacobs Ladder
D
U
Jacobs Ladder
D
Ledge
D
Platform
IN
Ledge
Ice Tunnel
OUT
IN
OUT to crawl
Ledge
IN
TO CRAWL
Northern ice cliff
U
D
Pylon
Platform
OUT
IN
Shuttle
Jacob's Ladder and the Control Room
THE MICRO USER

Part 7 of Stuart Booth's Snowball map – Jacob's Ladder and The Control Room

tion you are playing – apparently it is the store for all objects finished with or else not yet activated.

It is quite clear to me that The Lord of the Rings is as bug infested as The Hobbit was. What a pity that the programmers weren't both a little less ambitious and a little more painstaking. However, I imagine they were under pressure from people who wanted to see a supposedly marketable product at any cost.

I confess that, having run through The Lord of the Rings once for the purposes of this column, I put it aside as not being worth serious play. Sadly, this was like so many of the offerings from Melbourne House.

Tim Clapp provided a list of the vocabulary in Circus; he very properly deleted the naughty words before sending it on to a sensitive old codger like me.

Finally, Tim wonders if the barrel in Citadel has any other use apart from being an alternative method of getting into the witch's house.

I've had a charming letter from Stephen Gilbert on Countdown to Doom and Rebecca Wombwell's problems (see the September issue of *The Micro User*). In particular he deals with the mazes: For the first, try F, R, R, R, F, R, picking up the discs as you go. Next go D, E, take reactor, W, N, Say FLEZZ, N, NW and insert the discs into the computer in the order you discovered them.

The swamp maze has to be mapped by dropping objects: Since you can't see in this maze, you have to enter GET and INV in every location to see what you've actually picked up – ingenious.

Stephen has troubles with Dungeon Adventure, my Level 9 favourite. The silver mask is a treasure; eat the invisible objects to avoid the troll and pass on to his sweet smelling home. The rock with swirling grooves is just scenery, the green gem simply needs smashing and the buttons on the throne need pressing. Have fun.

Iain Mclaren has some interesting observations on The Hulk. If you enter P or T the display comes up with DID:64, DID:56, DID:64, DID:56 and so on. If he then entered X or V the program seemed to be working but the DID statements kept appearing: Why is that?

He would like to leave the underground room, pass the chief examiner and the warp area beyond the treasure depository. Comments and suggestions welcome.

Dave Martin is drawing up maps for Ravenskull (thanks): In the meantime he confirms that Ravenbees can only be killed with bow and arrow on screens 3 and 4. Screens 1 and 2 need careful timing to pass the bees. In the final section of screen 1 there is another scroll – it's deadly.

Kristoffer Gavin (who didn't give his

Turn to Page 44 ▶

Hall of Fame

Marcus Turner has sent in a succinct solution to **Lords of Time** with detailed maps of the mazes: He also sent solutions to a number of lesser adventures. Thanks.

Richard Entwistle has sent me a perfect logical map of **Twin Kingdom Valley**. I am grateful.

◀ *From Page 43*

address) asked for complete solutions to several games: For the sake of all my readers I have to say that I can't oblige.

There are three reasons: One is the sheer cost of photocopying, the second is the fact that a stamped addressed envelope is essential for a personal reply (it's amazing how many of you forget); and the third is that sending complete solutions would render this column redundant. I may have Irish ancestors, but we aren't daft.

Kristoffer has learnt that in the Price of Magik, if you CAST BOM or CAST ESP in seemingly unlikely places, you may learn an awful lot to your advantage. Well done.

Philip Sharpe hoped for tips on completing Thunderstruck by Audiogenic: I really think that is the province of my colleague Hac Man now; if you

examine the June issue of *The Micro User*, you'll see his map of Thunderstruck II.

So Philip, if you write to Hac Man and ask nicely, who knows? He and I agree that arcade adventures tend to be more arcade games than adventures.

Stop press: I have just received a pre-production disc of a revised Village of Lost Souls. The Magus team have been signed up by Robico and this production is Master-compatible, so expect a comment on this new version next month.

The cassette for model B/B+/Master costs £9.95 and the disc version (with extra features) is £12.95.

A Master-compatible version of Robico's The Hunt has also just arrived – first glance suggest the usual high quality; I'll have a full review ready for next month.

Incidentally, Rob O'Leary tells me that he is working on versions of their adventures for the Archimedes. I am saving very hard indeed.

You'll find their games in good software dealers or via mail order from Robico, 3 Fairland Close, Llantrisant, Mid Glamorgan CF7 8QH.

See you next month and until then, happy adventuring.

Helpline

Robert Wainright mailboxed a query: How does one light that wretched lamp in **Kingdom of Hamil?** Simply type ON. I had to go back to the adventure, check with my *Electron User* colleague Pendragon and still almost drove myself insane providing the answer. Why not provide the grammatical and obvious LAMP ON?.

Verbs (if one can call ON a verb in this context) should nearly always have nouns: If we don't look after grammar, we are reduced to the kind of illiteracy which produces media morons who talk about *government* without any qualifying article, because they appear not to know that a common noun always requires an article.

David Cornish (age 11) has offered some help for teacher John Sanderson who had queries on the mathematical adventure game **L** (see the June issue of *The Micro User*). The Cook is 7, 11, 8 and the electrician is 4, 2, 1, 2.

To escape the drogo guards, type the square root of their number. The ape can be turned into an owl by typing APE AWE OWE OWL and the magic word is NEUMANN.

If you want the bottle and phial, enter PLAY PIANO and EWQEWQTRRETRRE; if you want to put shapes into the bath enter USE (shape).

The solution to the spiders web is r,r,r, l,l,l, r,r,r, l,l,l, r,r,r, l,l, r,r, l,r, l,r.

Finally, the main answer to the problem is to go to the telephone room, ring 610 until the abbot answers, drop everything, push chest and go through the drogo maze.

Thanks to Bill Hensman I now have a complete solution to this adventure; I shall feature it as soon as space permits.

Wyndham Townend offers advice on killing the vampire in **Kingdom of Hamil**: Lead him to the Tapestry Room and open the curtains (similar to a certain horror film I notice).

Steve James can't find the Will in **Philosopher's Quest**: It's in the hall of the bungalow where the little old lady lives, but you have to do a lot of dog retrieving to find it. A full solution to this adventure will appear soon.

Steve is also stuck in **Hampstead:** What does he do after getting a job at the Bank, reading the memo and opening the filing cabinet? Going to the Boardroom and voting option 3 will get him advancement.

Help for Todd Newman comes from Mrs B. Gibbs: In **Denis through the Drinking Glass**, Drop ticket (bought from the policeman outside No. 10), take wire and run. She adds that one should not forget to drink every tenth move.

Classic Adventure: The (dynamite) rod should be found at the finish of the adventure in the vast hall. Take it, NE, drop rod, SW, BLAST and there you are.

Kay Chappell offers some help with **Wizard's Challenge:** Once you have collected everything of value from the classroom area and you have got rid of the bully, go to the Music Room and SING. Apparently she has a complete solution – I'd love a copy.

Kay has problems in **Labyrinths of LaCoshe:** Having collected all the treasures and performed all the tasks, she is still five points short of being allowed to open the door to Hades. I have examined Roger White's dissertation on the game and I wonder if she has completed the adventure in less than 136 moves.

I shall be including extracts from Roger's analysis of Labyrinths of LaCoshe some time next year, not only to help people, but also to show how philosophers approach adventures.

Kay is stuck in **Haunted Abbey** as well. I haven't completed this game, but a way of obtaining the listing was mentioned by my predecessor, Alice, a couple of years or so ago: She got it from a Cornish clergyman I seem to remember. Start to load a saved position then press Escape before loading is complete. After that you can list the game.

Kay is stuck with the trendy troll, can't escape the amphitheatre or the monster's head and would like to avoid drowning. I should be glad to receive legitimate solutions.

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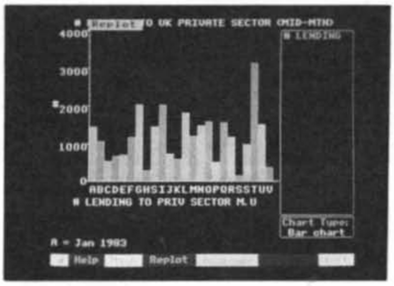
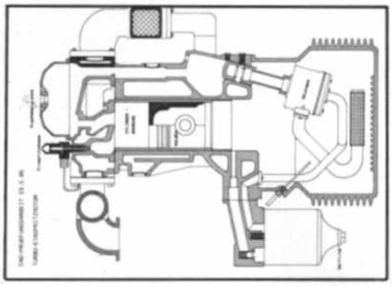
MU11

Every PLOTMATE picture tells a story



# Replot TO UK PRIVATE SECTOR (MID-MTH)
# LENDING
# LENDING TO PRIV SECTOR M.U
A = Jan 1983

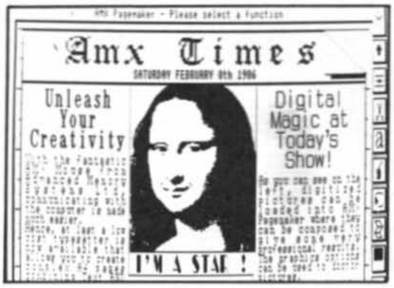
DOMESDAY
A typical bar chart from the Domesday database. Hard copy is obtainable via the Plotmate BBC Welcome disk.



CAD
Example from SUPERDRAFT running on the NIMBUS.

Political
Borders
across
Europe

DIGITISING
Map of Europe digitised and edited using LINMAP software.


AMX Pagemaker - Please select a function
Amx Times
SATURDAY FEBRUARY 8th 1986
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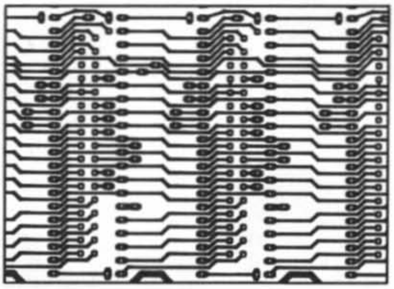
Digital Magic at Today's Show!
I'M A STAR !

IMAGE SCANNING
Linscan screen file of 'MONA LISA' incorporated into AMX PAGEMAKER.



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MU11

Your technical questions answered by MIKE COOK

PROBLEM SOLVED

Master tapes

DO you know of any company that has manufactured a peripheral enabling me to use cassette tapes on my Master Compact 128? I would like to put my tape copies of Basic games on to disc. – **A. Brigg, Keighley, West Yorkshire.**

● *No, as far as I know no one is producing such a device. It would be quite tricky to make as you would also need to supply the software to intercept the *TAPE command, as this does nothing on the Compact.*

Is there a gap in the market that some manufacturer would like to fill? I somehow doubt it.

Bothersome beep

I HAVE a BBC Micro and after some years of trouble-free service it has developed a problem at switch-on. Recently it often gives a long, single, low-tone beep, with both Caps Lock and Shift Lock lights coming on together, and nothing on the screen.

If I switch off and try again it sometimes repeats this sequence, but often behaves normally – beeping twice and starting up. It appears to be a random choice whether I get a normal start or not.

Giving the machine a jolt sometimes helps, but I am haunted by the fear that one day it may refuse to come on at all. – **L.E. Scull, Backwell, Bristol.**

● *All BBC Micros give a continuous tone when they are not working, so there is no pointer there. The clue is that this is an intermittent fault and giving it a swipe sometimes persuades it to toe the line.*

All this points to an intermittent mechanical connection. The area most likely to fail in this way is the connecting cable betwen micro and keyboard. Try removing it and putting it back again. This often seats it properly and will give you a few more years of service without problem. A new one can often help.

The problem could also be a pin bent under an IC, or a faulty IC socket. Having said that, locating it could be tricky and you might be better off sending your micro to a repair shop.

Crossed pins

I HAVE been reading *The Micro User* for about two years now and have always read Problem Solved with great interest and now I have a problem for you. After doing some work involving the analogue port I managed to cross two wrong pins somewhere. These controlled the first joystick's fire button and now the micro is continually firing when a game is running.

Mine is an issue 7 model and I have tried replacing the D7002C but discovered this seems to control only the joystick movements, not the firing action. Can you tell me what else it could possibly be? – **Derek Weeting, Houghton-le-Spring, Tyne & Wear.**

● *I am surprised you managed to damage your micro in this way by simply mis-wiring the analogue input port. I am sure you did something else more nasty to the poor thing.*

The chip that controls the fire buttons is the system VIA, a 6522. This is a 40 pin chip (a big one) and is located next to the keyboard connector. You could swap it with the other 6522 next to the user port plug. If you do this bits 5 and 4 of the user port would not work, so if you use them you will have to obtain a replacement chip.

Sound sampler

I WOULD be grateful if you could let me know whether you have covered the construction of a digital sound sampler for the BBC Micro in past issues of *The Micro User*. If so, where can I obtain all relevant information, such as PCB layout and components list? – **Christos Yianni, London W9.**

● *A digital sound sampler was published in the January 1986 edition of* The Micro User *. Unfortunately all the printed circuit boards have been sold, so the kit is no longer available. However, if you send a stamped addressed envelope to Musbury Consultants they will send you a photocopy of the PCB layout. As this is a double-sided plated-through-hole design it would be difficult to make yourself and you may need professional assistance.*

Sideways software

I HAVE just purchased a Watford rom/ram board but am still in the novice category. I would be grateful if you could tell me of any text book, manual, literature or past issue of *The Micro User* which gives a basic description of the software behind sideways rom/ram. – **G Abraham, Preston.**

● *The best guide to the operation of sideways memory is in the Advanced User Guide, but this is a little technical for some readers. The basic theory is simple – sideways memory is simply an area from address &8000 to &BFFF that can be derived from one of up to 16 different devices, and it usually contains machine code programs.*

There are a few books devoted to the subject and you'll find several advertised in The Micro User *by companies like Watford Electronics and Technomatic. One of the books is by Bruce Smith and called BBC Micro Sideways Roms and Rams and costs £9.95.*

Loading problems

I HAVE a BBC Micro with a Prestel chip fitted and have problems loading some games from tape. I dare not buy a game unless I know it will load in case I'm wasting my money.

As a new BBC Micro user I don't have the slightest clue to what is going on. Could you put me in the clear – **S. Creed, Surrey.**

● *It could be the Prestel chip causing problems so why not try removing it first? However, it is most likely to be a problem of head alignment on your recorder. If tape recorders were intended to be used on computers they would have been designed with a larger bandwidth. Most experienced micro users know about this but it is worth repeating for newcomers.*

Next to the recording head on your tape recorder is a small screw which is sometimes accessed through a hole or you might have to remove a panel. While you are playing and listening to your tape if you adjust this screw you should hear the sound go between muddy and bright. It is this bright sound you want, and the game should then load without problems. You might need to repeat this for different tapes and choose the best compromise.

Logging data

THERE are occasions when it would be useful to have a record of, say temperature, over a period of a day or a week even. One way of doing this might be to use an A/D converter and leave my BBC Micro running – but this does not seem to be very attractive.

Could you suggest some way of recording such a signal from say temperature, pressure and humidity, at say, hourly intervals, either in digital or analogue form for a period of a day for instance, and then feeding the information into the micro. – **B.A. Freake, Louth, Lincs.**

● *It's amazing how the wheel comes around full circle. What you are describing is known as a data logger and they have been around much longer than*

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◀ **From Page 47**

personal computers.

The only problem here is the cost – most data loggers will cost you more than your micro. In fact one of the first uses of personal computers was to use them as low-cost data loggers.

There is nothing wrong with leaving your micro turned on all the time, and remember you don't have to have a monitor connected or switched on for it to work. Or you could turn your micro on and off with a time switch and set link 5 on your keyboard to make it execute a !BOOT file each time it is switched on.

Using two DFSs

I HAVE a BBC Micro with DNFS 1.2. I am thinking of purchasing a Winchester drive, but I will need ADFS with the 1770 FDC. The problem is that I have some hardware that will only work with the DFS I have.

Is there any way in which I can swap over the two FDCs without changing chips. – **Michael Pargeter, Hitchin, Herts.**

● *You can get an Acorn DFS that uses the 1770 chip and an adapter board to change the disc controller chip. This can be installed in the BBC Micro along with the ADFS.*

Make the ADFS the top priority chip then on power up you hold down the D key and the DFS initialises. I use this method to run both the Watford and Acorn DFS's in my machine at the same time.

Moving memory

I HAVE an issue 7 BBC Micro and when I used a memory editor I noticed that several locations are unstable. Their contents change at varying speeds from once every second to so fast that it is a blur.

When I placed the cursor within one section of memory, the cassette control relay switched on and off very rapidly. Have you any observations on my problem? – **Paul Downes, Anfield, Liverpool.**

● *There is absolutely nothing wrong with your micro. Several memory locations are constantly changing during its normal operation.*

The BBC Micro is continually being interrupted by various devices and what you are seeing is the result of these interrupt service routines. For example page 01 memory (from 0100 to 01FF) contain the stack for the processor. Any call to subroutine or interrupt service routine will use this area to store the return address. Locations in page 02 contain the variables used to keep track of the video display and page FE contains the machines internal hardware interface area.

Finally, the simple act of running your editor utility will affect some areas of memory, and this is what is causing the cassette motor to toggle. For a full explanation of the micro's memory locations and what they contain see the Advanced Users Guide.

Battery operation

I HAVE a BBC Master 128 and will be living in a caravan without mains electricity for a few months.

The news in the September edition of *The Micro User* reports on a circuit you designed to power a BBC Micro using a car battery. In addition to the micro I have a BMC (BM-12A) monitor, a Cumana double disc drive and a Taxan (KP810) printer. Could I use dry cells to power all my equipment? – **Peter Hawksley, Swaffham, Norfolk.**

● *It is possible to run most of this from batteries but it will be pricey. The circuit was published in the April 1987 edition of* The Micro User *but would allow you to run only the micro and a single disc drive. To run a second drive of a double drive you would have to duplicate the circuit. It is a simple matter to power the two drives separately.*

As to the printer, it probably requires +5V and +24 volts. It should be possible to get this out of the step-up circuit by changing the ratio of R5 to 18k

TAXAN HAVE
MADE THE BBC
A PLEASURE
TO WATCH.
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Your technical questions answered by MIKE COOK

PROBLEM SOLVED

(Figure VII in that article) but I am not 100 per cent certain if it will supply all the necessary current. You will have to remove the printer's power supply, again a simple plug and socket job.

There is not much hope with the monitor so the best bet is to get a battery/mains TV set.

You need three Body Build packs No. 41(a), and assembled it would cost you £168. You would also have a lot of rewiring. If I was in your position I would look at the small diesel generators that are available quite cheaply. At least after your time in a caravan you could recoup some of the money by selling it.

Tracing cracks

Certain keys on my BBC Micro 0,=,@,X,P,<,> and + have suddenly stopped working, for no apparent reason but the keyswitches themselves seem to be in perfect working order. – **Alan Horn (15), Chester-le-Street, Co. Durham.**

● *All your faulty keys are on the same line from pin 9 of IC3 – the 7445 on the keyboard. Also on this line is function key f9. If this still works there is a crack in the printed track after this key. If this is faulty the crack is somewhere else.*

Either way, you could go crack hunting with a magnifying glass and continuity meter. However, perhaps the simplest way is to trace the track from the IC to the furthest key in this group (in this case the left-hand pin as you look at the tracks, of the > key). Then solder a wire link from this key back to the IC.

Using Trak-ball

AT the moment I use a Quickshot II joystick on my BBC Micro via a Proteck joystick interface in the analogue port. I was wondering if I would be able to use an Atari Trak-ball to control games via the same interface. – **Richard Walker, Aberystwyth, Dyfed.**

● *Yes, the Trak-ball will produce the same sort of signals in the JS mode as a Quickshot II.*

Interfacing plotters

I HAVE access to two types of XY Plotters and would like advice on the best method of interfacing them with my BBC Micro.

The XY Plotters I could use are a Heath Servo-Recorder Model EU-2B or EUW-20A, and a Gould Model 50A3 AS 258F with 10S 7723497 amp 10S 7723493 time base.

If either plotter is suitable, it would save a considerable sum on buying a new one. – **Derek Lydiate, Wolverhampton.**

● *Unfortunately both these plotters are designed to plot analogue voltages rather like an oscilloscope. They can be driven with both X and Y analogue or X on a time base and Y analogue but they were not meant to be driven from a digital computer.*

However you could fit digital to analogue converters to the user and printer ports and feed these into the X and Y inputs of the plotter. You would then have to control the pen lift mechanism, say, with the cassette relay and write some software to control it. Unfortunately the resolution would only be 256 by 256 points.

To get better resolution from the set up you would need better D/A converters, say, 12 bits or 1024 points and hang them on the 1MHz bus.

WATCHING YOUR BBC PROGRAMS ON TAXAN'S SUPERVISION 620 OR 625 IS A FEAST FOR THE EYES. BECAUSE THEY'RE PROFESSIONAL COLOUR MONITORS THEY GIVE YOU A BETTER QUALITY PICTURE THAN EITHER A TV OR MEDIUM RESOLUTION MONITOR. AND WITH THEIR SUPER HIGH CONTRAST TUBES (FOR SHARPER TEXT AND MORE VIVID COLOURS) AND FOUR SWITCHABLE COLOUR TEXT MODES, THEY MAKE EXCELLENT VIEWING. (HOWEVER IF YOU PREFER TO WATCH IN MONOCHROME ONLY, TAXAN HAVE A RANGE OF MONITORS - THE KX117, KX118 AND KX119). TAXAN ALSO OFFER TWO BBC COMPATIBLE DOT MATRIX PRINTERS, THE KP815 AND KP915. THEY'RE QUICK AND QUIET AND BOTH PROVIDE NEAR LETTER QUALITY. SO NOW YOU'VE SEEN OUR IMPROVEMENTS FOR THE BBC,™ GIVE US A RING. WE'D LOVE TO HEAR YOUR POINTS OF VIEW.

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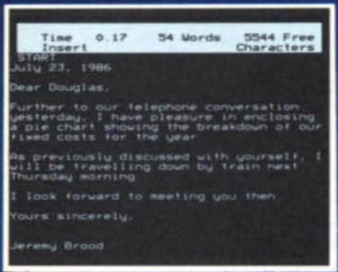
TO FIND OUT MORE ABOUT THE TAXAN RANGE OF PRODUCTS, CALL US ON 0344 484646.

All this in just



```
  Time    0.17     54 Words    5544 Free
  Insert                      Characters
 START
July 23, 1986

Dear Douglas,

Further to our telephone conversation
yesterday, I have pleasure in enclosing
a pie chart showing the breakdown of our
fixed costs for the year

As previously discussed with yourself, I
will be travelling down by train next
Thursday morning

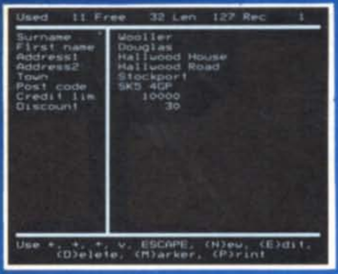
I look forward to meeting you then

Yours sincerely,


Jeremy Brood
```

WORD PROCESSOR

Compose a letter, set the print-out options using embedded commands or menus, use the mail merge facility to produce personalised circulars – and more!

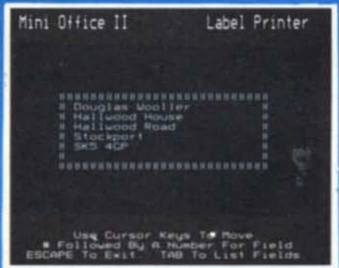


```
Used   11 Free   32 Len  127 Rec     1
Surname        Wooller
First name     Douglas
Address1       Hallwood House
Address2       Hallwood Road
Town           Stockport
Post code      SK5 4GP
Credit lim        10000
Discount             30

Use +, +, +, v, ESCAPE, (N)ew, (E)dit,
     (D)elete, (M)arker, (P)rint
```

DATABASE

Build up a versatile card index, use the flexible print out routine, do powerful multi-field sorting, perform all arithmetic functions, link with the word processor – and more!



```
Mini Office II            Label Printer



     ##############################
     # Douglas Wooller            #
     # Hallwood House             #
     # Hallwood Road              #
     # Stockport                  #
     # SK5 4GP                    #
     #                            #
     ##############################


       Use Cursor Keys To Move
   # Followed By A Number For Field
 ESCAPE To Exit   TAB To List Fields
```

LABEL PRINTER

Design the layout of a label with the easy-to-use editor, select label size and sheet format, read in database files, print out in any quantity – and more!

70
60
50
40
30
20
10
0
J F M A M J J A S
PRODUCTION COSTS
CUB
DATABASE SOFTWARE
Mini Office II
Mini Office II
Main menu
Word Processor
Database
Spreadsheet
Graphics
Communications
Label Printer
Exit Mini Office II
(c) Database Software 1986

...and at a price

Mini Office II is a comprehensive integreated suite of programs setting a new standard in home and business software.

These sample screenshots illustrate just a few of the wide range of features, many of which are usually only available on software costing hundreds of pounds. Most are easily accessed by using cursor keys to move up and down a list of options and pressing Return to select.

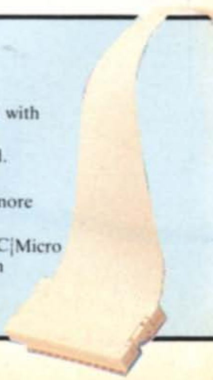
Mini Office II takes over where the original, highly successful Mini Office left off, with numerous extra features, two additional modules, a program to convert existing Mini Office files to Mini Office II format, and a 60 page, easy to follow manual.

And it's at a price everyone can afford!

DATABASE SOFTWARE

Europa House, 68 Chester Road,
Hazel Grove, Stockport SK7 5NY

Now available on a power-packed rom board!

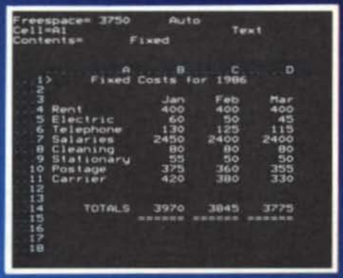


- Four 32k roms on one board packed with 128k of super fast machine code.
- Easy to install – no soldering needed.
- Split second application selection.
- Frees valuable ram space for much more data.
- Fully compatible with the whole BBC|Micro range, Aries or Watford shadow ram board, and tape, DFS, ADFS and ECONET filing systems.

ONE package!

SPREADSHEET

Prepare budgets or tables, total columns or rows with ease, copy formulae absolutely or relatively, view in either 40 or 80 column modes, recalculate automatically – and more!



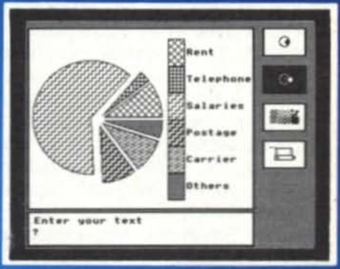
```
Freespace= 3750     Auto
Cell=A1                       Text
Contents=        Fixed

            A          B           C          D
  1>        Fixed Costs for 1986
  2
  3                  Jan         Feb        Mar
  4 Rent             400         400        400
  5 Electric          60          50         45
  6 Telephone        130         125        115
  7 Salaries        2450        2400       2400
  8 Cleaning          80          80         80
  9 Stationary        55          50         50
 10 Postage          375         360        355
 11 Carrier          420         380        330
 12
 13
 14       TOTALS    3970        3845       3775
 15               ======      ======     ======
 16
 17
 18
```

MASTER DISC NOW AVAILABLE

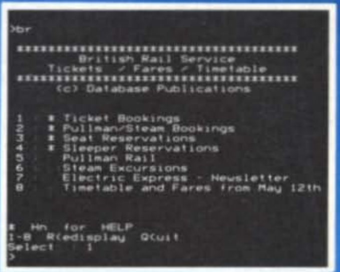
GRAPHICS

Enter data directly or load data from the spreadsheet, produce pie charts, display bar charts side by side or stacked, overlay line graphs – and more!



COMMS MODULE

Using a modem you can access services such as MicroLink and book rail or theatre tickets, send electronic mail, telex and telemessages in a flash – and more!



```
>br

 ########################################
         British Rail Service
     Tickets  / Fares / Timetable
 ########################################
       (c) Database Publications

 1    * Ticket Bookings
 2    * Pullman/Steam Bookings
 3    * Seat Reservations
 4    * Sleeper Reservations
 5      Pullman Rail
 6      Steam Excursions
 7      Electric Express - Newsletter
 8      Timetable and Fares from May 12th


*  Hn  for  HELP
1-8  R(edisplay  Q(uit
Select    1
>
```

that can't be matched!

INSTANT Mini Office II

INSTANT
Mini Office II

Mini Office II

BBC B, B+	
Cassette	£14.95
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MASTER	
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3½" disc	£21.95
INSTANT MINI OFFICE II	
On rom for full BBC range	£59.95

Turn to order form on Page 149

Discover the inner secrets of arcade games with . . .

THIS month's column features, by popular demand, a complete solution for Cholo, Firebird's wonderful 3D strategy game.

This latest mega-game seems to have captured more imaginations – and postage stamps – than anything since Repton 3, and it's certainly drawn more pleas for help than any other.

Cholo gives a first impression of being another Elite – it's an (initially) immensely complicated game that comes with a map and instruction manual/novelette, and features Elite-style 3D vector graphics. It is, however, an altogether different proposition.

Many thanks to David Backhouse, Stuart Booth, Stephen Levin and Michael Smith for their excellent tips, which now follow:

The game starts with you controlling Rizzo, a RatDroid, who is wandering around Cholo's Central Computer building. Use the map in the manual to find the Cyber 1 computer, and log on by colliding gently with it.

Read PassITXT into rampak 1 and then run it. This gives you a list of passwords, which can be used to control the many other robots you will find along the way. Don't forget to write them down.

As you leave the building you will find a small robot travelling along the street in front of you. Chase it and shoot it until you get a message saying that it is temporarily paralysed. Stop shooting immediately – this isn't Elite now, you know! Log into this robot with the password PLUGIN and you now have control of Igor the Hacker.

Stryker cheat

Steve Botterill of Superior has told me about a cheat mode built into the enhanced Master version of ***Stryker's Run.*** *When the title page is on the screen, hold down the keys C, H, R, I and S (for Chris Roberts, the author). Then start the game and you will find it frozen, but you can move the screen left and right by using the cursor keys.*

Cheat modes in games are always interesting, but I'm sure this one's just to let you admire the pretty graphics.

You can use this same method to take control of Guard robots by using the password XXXXXX. However, you lose control of them once you move out of their allocated area.

Take Igor back to Cyber 1, where you will find RadarPRG – a short range radar scanner. When this is on, your position is shown in the centre of a large scale map of the surrounding area. It is a good idea to share important programs between droids, because when a droid dies all the information in its rampaks is lost.

Switch back to Rizzo and search around the buildings until you see Anneka the Flying Eye coming in to land. Disable her in the same way and log into her with the password Brazil. Fly her to Logic Island and position her on the triangular-shaped teleport pad. Leave her there and switch control to Igor.

Guide the Hacker to Group Pier where you will find another teleporter. Move on to it and he and Anneka will change places. Enter the church, where you will find another computer, Cyber 2, against the far wall. Don't worry about the robot guard immediately inside the door, it's dead.

When you log on you will find two programs, ReadmTXT and SurvyPRG. The former is simply a credit for the authors but the latter switches on two vidbots (camera robots), Ridley and Fellini.

Although they appear to be sitting in the sea in the south-east quadrant of the map, they are in fact located on an unmarked radioactive island. Ridley is particularly useful, because he is permanently located in a room.

To save your current position simply select Ridley, then press Escape followed by f0. Go back to the teleporter and return to Group Pier.

Next go to the bridge by the McNeil river, but don't go across just yet. Transfer control to Rizzo and take him to the bridge as well. Switch to Ridley and save the game.

As Rizzo, race across the bridge as quickly as possible, swerving from side to side to avoid bumping into the guards, but don't fall in. And don't bother retaliating – it only wastes time.

Firetrack debugged

Many owners of the Watford Electronics DFS will have found to their chagrin that the (much better) disc version of mega-blast ***Firetrack*** *has hitherto been denied to them. I'm glad to report that the program's disc loader is now fully debugged and works, not only with the Watford DFS, but also on their rom/ram card.*

Maybe I didn't need to sell my BBC Micro (which had both) after all. Anyone with an early version of the game should contact Electric Dreams for an immediate upgrade.

When you finally get across you'll see pyramids on either side of the road. Follow the road and turn north after the third pyramid. In front of you will be a truncated pyramid. Go in the door on the north side.

Inside you will find a computer (Cyber 3) and a line of five apparently dead robots: A rat, a guard, an autodoc (revealing what one looks like), a hacker and a giant robot of a previously unseen type. The fifth is in fact not dead: He is Gort the Leadcoat, a powerful ally. After paralysing him, log on with the password KLAATU.

You now come to the difficult part: How to get the comparatively delicate Igor across the bridge. I have found the best method to be as follows:

Take Gort outside and move onto the eastern end of the bridge. Take control of Igor and move across the bridge, dodging the guards until his damage nears its limit. Switch to Gort and paralyse all the guards. Then guide Igor across at your leisure followed by Gort.

Once across, visit the Alan M Turing Science Institute (the building with the radar scanner). There you will find three computers, each designated Cyber 5. Logging on to any of them gives immediate control of Queen (a ship) and also access to a program, Hack1PRG. Next go to Cyber 3. If you already have

Hack1PRG, you will find a program called Hack2PRG. If not, you will be denied access. Return to the bridge and transfer both Hack programs to Gort.

Select Queen, and dock with the end of the pier in the harbour – not, take note, the one on the headland to the east. It's quite tricky, and may take several attempts.

Return to Gort, cross the bridge and go to the harbour, where you will find another teleporter pad in front of the eastern pier. Position yourself on it and you will be transported into the ship's hold.

Transfer control back to Queen and sail to the radioactive island, using the positions of Ridley and Fellini on the main map to guide you.

On the way you will notice a number of Rats swimming around you. Stuart points out that Rizzo can also swim. Take him in the ship instead of Gort.

You won't be able to move or use him, since he's still in the ship's hull, but if you move Queen elsewhere you'll find that Rizzo is now outside on the surface of the water.

You can just steer him towards the land. Once on it, however, don't take them back into the water or they'll die. This technique is re-usable. Also, before re-taking control of any seafaring droid after you've taken control of a landlubber droid, make sure you take control of Queen first, or it'll die with a splash.

Dock at the right-hand side of the pier on the island and transfer control to Gort, who will then disembark. There are five buildings on the island: Go in the door on the central one.

Located inside is another computer, Cyber 4, in which you will find two programs, AtmosTXT and C-C-CTXT. The former gives you the location of the Bunker Cap – the sealed entrance to the humans' underground bunker. Deeper inside the same building you will find Ridley and Koke, a Coca-Cola machine.

Disable Koke very carefully – reading C-C-CTXT will tell you that it is actually an armed bomb – then log into it. Take both Gort and Koke back to Queen and return them, one at a time, to the mainland.

Take Gort to the Cassadra aerodrome and locate Aviata, the plane at the northern end of the runway. Paralyse it, then transfer control to Koke, guide him to the plane and get on board.

Take control of Aviata and fly to the Robot Citadel, labelled Manic Mine on the map. It looks like a pyramid, but you'll soon know when you're near because ground-based robots will start using you for target practice.

Crash Aviata into the Robot Citadel to explode the bomb and destroy the Bunker Cap. With a fancy firework display in the background, a message appears thanking you for freeing the people of Cholo. The game is now completed.

The other robot you will encounter is Dr. John, the unknown autodoc. I never use him myself, but he can normally be found wandering around somewhere to the right-hand side of the bridge. Log into him using the password STETHO.

David says that the doctor can log into Aviata without paralysing him. To do this you should use the password FLYBOY.

Cholo is indeed a superb game – one that, once finished, you could keep coming back to time and again. I must say I was mildly irritated by the fact that you can only save the game while controlling a robot that is inside a building. But that's about my only complaint, and even that faded once I'd gained control of Ridley.

The only other points are a couple of possible bugs. I once logged into Igor along Bridge Street only to find SurvyPRG already in his rampak. The other occurs if you paralyse and take over a guard which is subsequently killed. The "robot select" page appears and the available robots are scanned through very rapidly, but the game no longer recognises any keyboard input. The only way out is to press Break.

● *That's all for now. Next month's goodies will include conversions to make more of your old favourites work on the Master.*

Cavalry to the rescue

It's Repton corner again. Simon Woods of High Wycombe has written in to say that he is stuck on screen C of ORIENT in ***Around the World in 40 Screens.***

There is probably a good reason for this: The first release of the game has a bug on this very screen. Amazingly, the bug is so small as to be only one bit of a single byte in the whole Orient, file – but the screens are designed so fiendishly that this screen is now impossible to complete.

But never fear, the Yorkshire cavalry is coming to the rescue. Simply send the game back to Superior for a free replacement. Alternatively, try the Hac-Man method:

```
*LOAD ORIENT
?&3736=&B6
```

and then, to a blank tape or disc:

```
*SAVE ORIENT2 31E0 +2620.
```

Load this new file with option L – calling it, of course, ORIENT2 – into either the game or the editor, to find that a safe has appeared where there was previously only a blank wall. Voila!

Simon has also spotted a couple of errors in the ***Repton 3*** *pokes given in the July column. The first poke, ?&FED=0, should read ?&2FED=0 and the one for infinite lives should read:*

```
?&311C=&A9:?&311D=1
```

*He also points out an omission in the same section which is entirely my fault. First type *DIR D, before:*

```
PAGE=&900:LOAD"REPTON1"
```

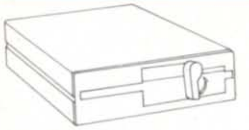
Then enter the following line:

```
5 MODE 5
```

before the pokes at line 115. This procedure was correctly shown in the tip to display maps F-H, published in the June issue of The Micro User.

The Perfect Partners.

VIGLEN DISK DRIVES



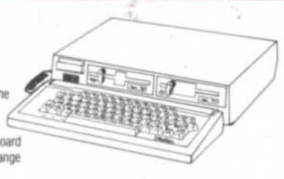
Simply plug a Viglen disk drive into your BBC B (fitted with DFS), B+, or Master micro and immediately benefit from 400 or 800 KB of extra data storage capacity.

Stock Code	Description	Price inc. VAT	
VPD 0241	400K Single Drive, No PSU	£119.95	NOW WITH 3-YEAR WARRANTY
VPD 0246	400K Single Drive, + PSU	£134.95	
VPD 0243	800K Dual Drive, No PSU	£222.95	
VPD 0248	800K Dual Drive, + PSU	£249.95	
VPD 0249	800K Bridge Unit + PSU	£264.95	
VPD 0250	5.25" + 3.5" Combined + PSU	£249.95	
SPO 14	Single 400K 40/80T Drive	£ 99.95*	SPECIAL OFFER
SPO 19	Dual 800K 40/80T Drive	£189.95*	

* These two models are offered with 12 months warranty

Please add £8.00 for insured courier delivery.

PROFESSIONAL CONSOLE UNIT

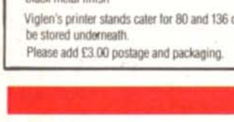


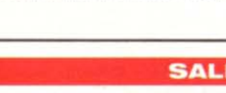
Give your BBC or Master micro a professional PC-look by replacing the existing lid with this smartly styled package which can house two disk drives. Complete with separate keyboard case and connecting cables. A full range of accessories is also available.

Stock Code	Description	Price inc. VAT
V0851	Viglen Professional Console Unit for the BBC micro	£49.95
V0861	Viglen Master Console Unit for the Master micro	£59.95

Please add £8.00 for insured courier delivery.

PRINTER STANDS





Viglen's printer stands are available in	Price inc. VAT
clear perspex, 80 col.	£19.95
136 col.	£29.95
high-impact ABS plastic colour-matched to most printers.	
80 col.	£14.95
black metal finish	£ 9.95

Viglen's printer stands cater for 80 and 136 column printers and allow continuous stationery to be stored underneath.

Please add £3.00 postage and packaging.

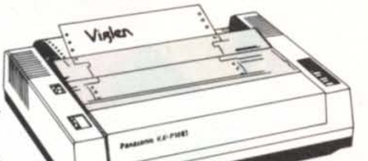
PANASONIC PRINTER KIT

The Panasonic KX-P1081 comes complete with £45.00 worth of accessories FREE including tractor feed and roll feed units with paper, printer cable, and a specially designed metal printer stand.

Features include:

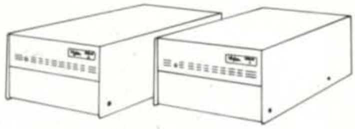
- * 120 cps draft printing, 24 cps NLQ
- * IBM and Epson compatibility through dip switch settings
- * Prints 80 columns on A4 cut sheets, continuous stationery or roll paper
- * 9×9 draft and 18×23 NLQ

Stock Code	Description	Price inc. VAT
SPO 79	Panasonic KX-P1081 plus accessories	£189.95



Please add £8.00 for insured courier delivery.

VIGLEN WINCHESTER DISKS



Plug-in 20 to 112MB of extra storage with the Viglen Winchester system.

Please add £8.00 for insured courier delivery.

Stock Code	Description	Price inc. VAT
Drive 0 Single		
V0150	VB20 20MB Viglen Winchester	£ 649.00
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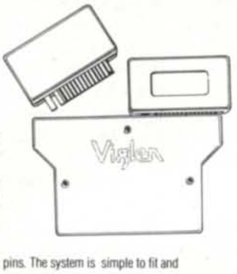
V0155	VB40 40MB Viglen Winchester	£1045.00
V0156	VB56 56MB Viglen Winchester	£1119.00
Drive 1 Second Drive		
V0160	VB120 20MB Drive 1 Winchester	£ 549.00
V0162	VB128 28MB Drive 1 Winchester	£ 599.00
V0165	VB140 40MB Drive 1 Winchester	£ 819.00
V0167	VB156 56MB Drive 1 Winchester	£ 899.00
V0157	20MB Tape Streamer Backup	£ 724.95

ROM CARTRIDGE SYSTEM



Designed by Viglen for use with the BBC B or Master micros, the Rom Cartridge System allows a range of Rom software to be used and interchanged easily without fear of damage to the delicate pins. The system is simple to fit and requires no soldering.

Stock Code	Description	Price inc. VAT
V0560	Viglen Rom Cartridge System for BBC	£12.95
V0559	Viglen Rom Cartridge System for BBC (low profile)	£12.95
V0550	Viglen Rom Cartridge System for Master	£14.95
V0561	Single Viglen Cartridge	£ 3.99

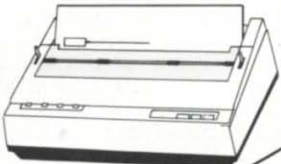
Please add £2.50 for postage and packing (£00.50 for single cartridge).

DAISYWHEEL PRINTER

The Panasonic KX-P3131 daisywheel printer is Diablo-compatible and utilises bi-directional logic seeking techniques to produce letter quality print at a rate of 17 characters per second (cps). Friction speed provides really efficient paper handling, whilst tractors are available as an option.

Stock Code	Description	Price inc. VAT
V0400	Panasonic KX-P3131 Daisywheel Printer	£299.95

Please add £8.00 for courier delivery.



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MU/11

Logon – and make a friend

Steve Gold takes a look at the MicroLink bulletin board

IN previous beginners' communications articles we've looked at the theory behind several areas of using a modem. Now we take another look at the fun side of computer communications. The MicroLink bulletin board is an exciting way to make new friends in the global village.

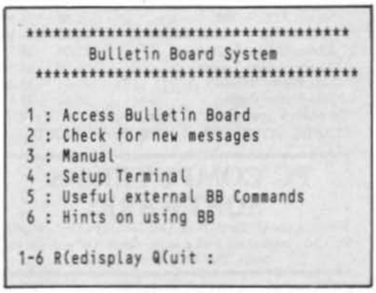
Many computer books will regale you with tales of how wonderful (and cheap) bulletin boards are and how, for the price of a local telephone call, you can send and receive electronic messages to and from dozens of like-minded computer communications enthusiasts.

The reality of bulletin boards – or BBSs as they are known in the trade – is somewhat less rosy. Because of their nature, BBSs are run on a single telephone line and, at peak periods, there can be several dozen callers all trying to log onto the board via this line.

Needless to say, the majority of BBS callers are disappointed and must either redial until their dialling finger turns red or try one of a range of other BBSs, many of which will be a long distance away.

But what if a bulletin board were available on local call access, with enough lines to cope with even the heaviest call load? Multiple-line BBSs are widely available in the US, where the concept of BBSs originated in the late 1970's, but the majority are subscription only and many users are frustrated by the slowness of the boards, owing to the timesharing that takes place on a single computer BBS.

In the UK, MicroLink, a powerful subset of the Telecom Gold electronic mail system, has a bulletin board which runs quite happily on its mainframe.



```
 *************************************
       Bulletin Board System
  *************************************

 1 : Access Bulletin Board
 2 : Check for new messages
 3 : Manual
 4 : Setup Terminal
 5 : Useful external BB Commands
 6 : Hints on using BB

1-6 R(edisplay Q(uit :
```

Figure I: The MicroLink bulletin board menu

MicroLink's computers are large and powerful. So large, in fact, that several dozen users can access the computer without any appreciable loss in speed.

The MicroLink bulletin board is just one of the many varied options available on the MicroLink system, the scope of which we'll be looking at in later articles. But on with the bulletin board.

The MicroLink bulletin board isn't a real bulletin board in the sense that BBSs operate. In reality, it's a complex and easy-to-use program that runs on the MicroLink mainframe.

Having said this, once accessed the system behaves – to all intents and purposes – as a real BBS would, except it has the value-added option of leaving you copies of all your messages to other users in your mailbox, as well as responding far quicker than any disc-based BBS would.

Unlike many BBSs today, the MicroLink network is accessible at all modem speeds between 300 and 1200 baud full duplex. Indeed, at the time of writing there is talk of a 2400 baud local call access to MicroLink over much of the UK. Add to that the large number of lines available to MicroLink, and it's not difficult to see why the MicroLink bulletin board has grown to be Britain's biggest – and most popular – BBS today.

The higher access speeds mean that messages can quickly be retrieved and spooled to disc for later reading offline. You can then return online to upload or type replies. Using such high speeds of access means that regular sessions on the MicroLink bulletin board can be accomplished in a matter of minutes – all helping to keep the telephone bill down to respectable levels.

But enough of talking about the system, let's log on. Figure I shows you the initial menu on the bulletin board.

The first option will take you straight into the bulletin board system – more of which in a moment – but the second is perhaps the most useful for regular users of the bulletin board itself.

Without actually running the bulletin board program, the second option allows you to quickly peek in and check for bulletin board activity. Figure II shows what happens when you select this option.

The third allows you to peruse the online manual, a sample of a which is shown in Figure III. MicroLink recommend that you download it for printing and perusal offline. For the more impatient, this well-written manual quickly familiarises you with the bulletin board commands used on MicroLink.

Many users never need to refer to the manual, such is the ease with which the bulletin board is laid out. If you've ever used a BBS before, then it's unlikely you'll need to refer to it.

The fifth and sixth options are also there to give help and give a short "get you going" list of commands that will smooth and simplify your progress through the MicroLink bulletin board.

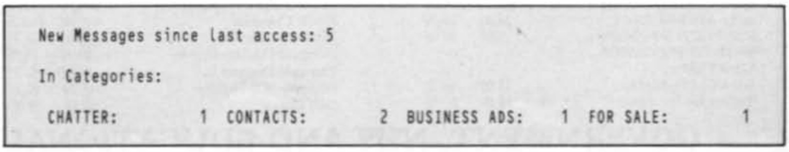
Just like when you first installed your computer – remember that? – the MicroLink system needs to know the size of your screen – number of lines and column width. Entering such information is done using the fourth option and isn't strictly necessary, but, like computer installation procedures, it makes life easier for the future.

Like the single line BBSs, the MicroLink bulletin board allows you to select one or more of the many categories available and either scan through (forwards and backwards) as shown in Figure IV and/or read the messages themselves as in Figure V.

Scanning the messages is quick and easy and can often pin-point the message that you're looking for in seconds. Just like the smaller BBSs, however, the real fun starts when you begin to read through the messages themselves.

Thanks to the power of the MicroLink computer, it's possible to individually select the categories of messages that you want to scan. In this way you can skip those messages which are not of general interest to yourself. Be warned

Turn to Page 57 ▶



```
New Messages since last access: 5

In Categories:

 CHATTER:        1  CONTACTS:        2  BUSINESS ADS:   1  FOR SALE:        1
```

Figure II: Checking for new messages

MICROMAN Computers

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PHONE 074488 3667

SHOWROOM

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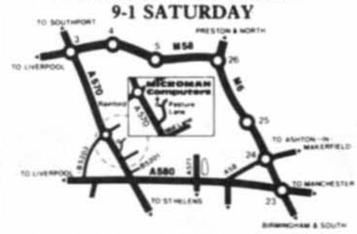
9-6 MONDAY TO FRIDAY
9-1 SATURDAY



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Additional Floppy Disc Drive	99.00	113.85
Pal TV Adaptor	26.00	29.90
• ECONET NETWORKS:		
Master Econet Terminal	329.00	378.35
Achemedes/Master Econet Module	43.47	49.99
Filestore E01	828.00	952.20
Filestore E20	721.00	829.15

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**Opus 5802D 800K 40/80T
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Eproms 27128 16K		P.O.A
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RAM 6264LP-15 8K	3.00	3.45
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though – most users find that all of the categories hold an interest for them.

Unlike the smaller BBSs, MicroLink is a clean bulletin board. Thanks to powerful programs that work in the background, unsuitable messages – and I'm sure readers will know what I mean here – are quickly pinpointed and withdrawn, so as not to cause offence to other bulletin board users.

Thanks to this useful system, MicroLink members of all ages can read and use the bulletin board system without any worry of being offended. Having said this, many bulletin board regulars like to talk about controversial topics – but well within the bounds of public decency.

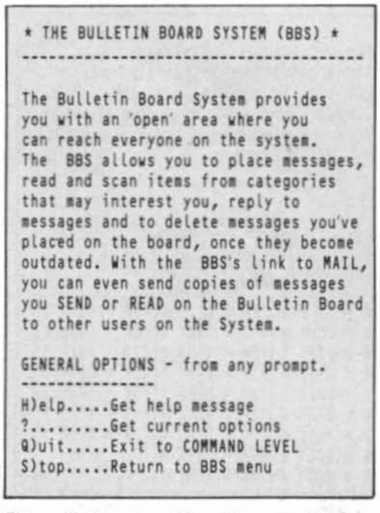
The same cannot be said of other BBSs, many of which contain text which – to put it mildly – is unsuitable for the majority of the public to read. The MicroLink bulletin board is a fun place to be, and it's a pleasant place for the family to enjoy with you.

Many modem users ask why use a bulletin board at all? In today's society we are all conditioned to stay within our own areas – with the result that the opportunities to make new friends are often limited.

Sometimes, the people we meet on trains and aeroplanes are less than desirable and wholly unsuitable to make friends with. That, sadly, is a fact of modern living.

What bulletin boards of all types allow people to do is to make new contacts – and forge firm friendships – with people they have never seen. Because MicroLink is a giant club of like-minded people. The bulletin board allows an interchange of messages and ideas on a scale never before seen in the UK.

A single BBS can – at best – hope to have just a few dozen regular users, many of whom jostle and compete for online time. The MicroLink bulletin board, on the other hand, is available at local call rates (from most of the UK) and is available on a 24 hour a day basis to all comers. It doesn't matter that the MicroLink bulletin board is accessible to several thousand people – there's always a line there for you to logon to, no matter what time of the day or night it is.

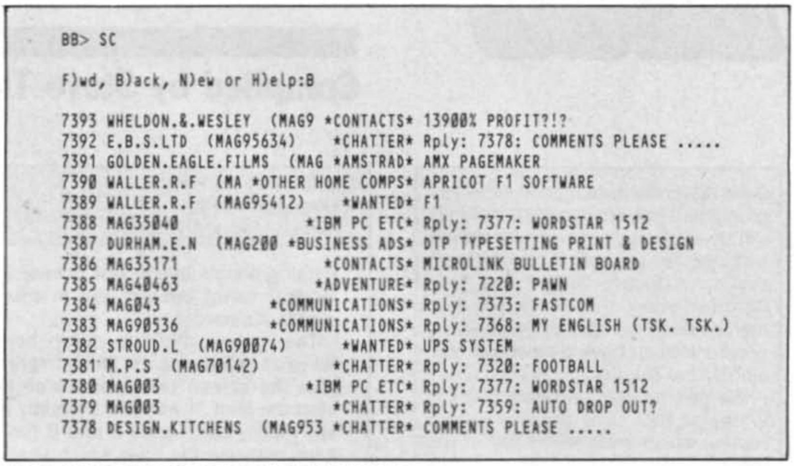


```
* THE BULLETIN BOARD SYSTEM (BBS) *
-------------------------------------

The Bulletin Board System provides
you with an 'open' area where you
can reach everyone on the system.
The  BBS allows you to place messages,
read and scan items from categories
that may interest you, reply to
messages and to delete messages you've
placed on the board, once they become
outdated. With the  BBS's link to MAIL,
you can even send copies of messages
you SEND or READ on the Bulletin Board
to other users on the System.

GENERAL OPTIONS - from any prompt.
---------------
H)elp.....Get help message
?.........Get current options
Q)uit.....Exit to COMMAND LEVEL
S)top.....Return to BBS menu
```

Figure III: An excerpt from the manual



```
BB> SC

F)wd, B)ack, N)ew or H)elp:B

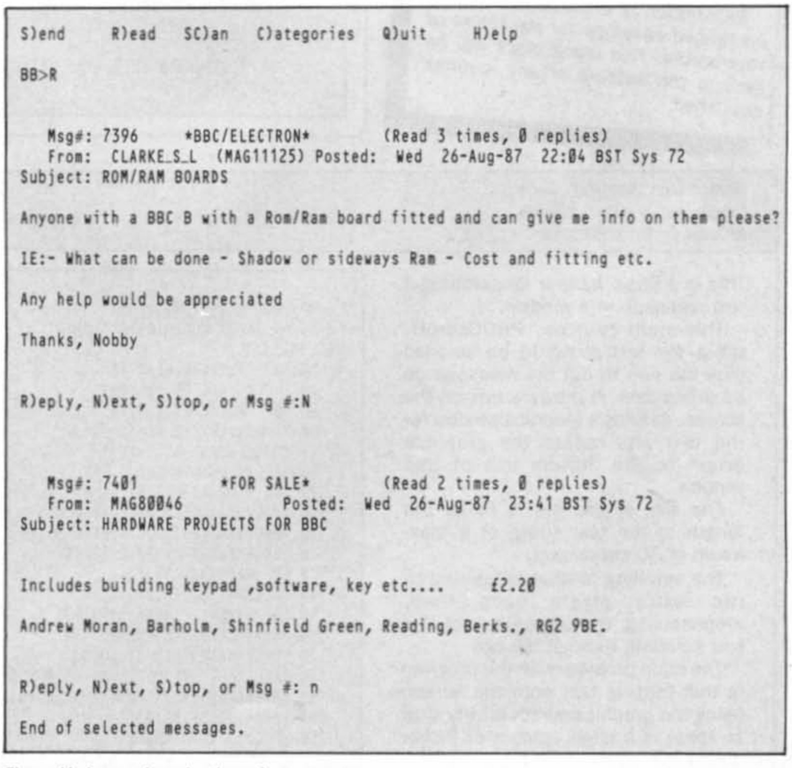
7393 WHELDON.&.WESLEY  (MAG9 *CONTACTS* 13900% PROFIT?!?
7392 E.B.S.LTD  (MAG95634)    *CHATTER* Rply: 7378: COMMENTS PLEASE .....
7391 GOLDEN.EAGLE.FILMS  (MAG *AMSTRAD* AMX PAGEMAKER
7390 WALLER.R.F  (MA *OTHER HOME COMPS* APRICOT F1 SOFTWARE
7389 WALLER.R.F  (MAG95412)    *WANTED* F1
7388 MAG35040                *IBM PC ETC* Rply: 7377: WORDSTAR 1512
7387 DURHAM.E.N  (MAG200 *BUSINESS ADS* DTP TYPESETTING PRINT & DESIGN
7386 MAG35171                 *CONTACTS* MICROLINK BULLETIN BOARD
7385 MAG40463                *ADVENTURE* Rply: 7220: PAWN
7384 MAG043             *COMMUNICATIONS* Rply: 7373: FASTCOM
7383 MAG90536           *COMMUNICATIONS* Rply: 7368: MY ENGLISH (TSK. TSK.)
7382 STROUD.L  (MAG90074)      *WANTED* UPS SYSTEM
7381 M.P.S  (MAG70142)        *CHATTER* Rply: 7320: FOOTBALL
7380 MAG003                 *IBM PC ETC* Rply: 7377: WORDSTAR 1512
7379 MAG003                   *CHATTER* Rply: 7359: AUTO DROP OUT?
7378 DESIGN.KITCHENS  (MAG953 *CHATTER* COMMENTS PLEASE .....
```

Figure IV: Scanning the bulletin board messages

Like the majority of MicroLink's varied selection of services, the bulletin board costs nothing extra to use beyond the normal MicroLink charges.

Most users find that accessing the MicroLink bulletin board is cheaper and more productive than repeatedly dialling a single-line BBS that may be several hundred miles distant.

MicroLink's mainframe computers are actually based in London – but for many readers, are accessible at local rates.



```
S)end     R)ead   SC)an   C)ategories   Q)uit     H)elp

BB>R


   Msg#: 7396     *BBC/ELECTRON*         (Read 3 times, 0 replies)
   From:  CLARKE_S_L  (MAG11125) Posted:  Wed  26-Aug-87  22:04 BST Sys 72
Subject: ROM/RAM BOARDS

Anyone with a BBC B with a Rom/Ram board fitted and can give me info on them please?

IE:- What can be done - Shadow or sideways Ram - Cost and fitting etc.

Any help would be appreciated

Thanks, Nobby


R)eply, N)ext, S)top, or Msg #:N



   Msg#: 7401         *FOR SALE*         (Read 2 times, 0 replies)
   From:  MAG80046            Posted:  Wed  26-Aug-87  23:41 BST Sys 72
Subject: HARDWARE PROJECTS FOR BBC


Includes building keypad ,software, key etc....     £2.20

Andrew Moran, Barholm, Shinfield Green, Reading, Berks., RG2 9BE.


R)eply, N)ext, S)top, or Msg #: n

End of selected messages.
```

Figure V: A sample selection of messages

THE MICRO USER

PROGRAM Library No. 9

Compiled by Steve Turnbull

Once again we have a good variety of programs: The Environment routines will be of great use to anyone writing software for use on many different systems, Double Height and Text Scroller show the basis for text manipulation on screen – although someone must have a smoother version of the scroller.

We have an improved version of the Wordwise Plus Date Stamper, and a routine which finds which day of the week a given date is. I'm sure this routine does not use the standard algorithm – although it works well – and the method of date entry is awkward. Can we have an all-purpose date decoding routine?

Send your routines – with full details of the language it is written in and the hardware/software requirements – on disc or tape to:

Steve Turnbull, Library, The Micro User, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Remember to enclose a stamped addressed envelope for the return of your media. Five blank discs will be sent to the authors of any routines published.

Name: Double Height
Language: Basic
Author: Matthew Waters

Printing double height text is easy in Mode 7 using Teletext, but in other modes it's harder.

The routine, PROCdb, given here takes as arguments the string to print plus the screen text coordinates to start the print. It will work correctly in any mode, but modes 3 and 6 have gaps between the lines which spoils the effect.

However using the small screen facility in the August issue of *The Micro User* you can even get rid of the gaps.

It works by redefining character 254 to be the top half of the character to be doubled and character 255 to be the lower half then it displays them one below the other.

One refinement is the addition of –10*(POS=0) in line 140. This forces a second line to be scrolled at the end of the current line in addition to the normal carriage return.

```
   10 REM * Double Height *
   20 ON ERROR MODE7:REPORT:PRINT" at li
ne ";ERL :END
   30 MODE1:REPEAT CLS
   40 INPUT"Please enter a string:"s$
   50 PROCdb(s$,0,10):REPEATUNTILGET
   60 UNTIL s$="end":MODE7:END
   70 DEF PROCdb(s$,X%,Y%)
   80 IF s$="" ENDPROC
   90 VDU31,X%,Y%:LOCAL A%,L%:X%=&70
  100 Y%=0:FOR L%=1 TO LEN s$:A%=10
  110 X%?0=ASCMID$(s$,L%):CALL&FFF1
  120 VDU23,254,X%?1,X%?1,X%?2,X%?2,X%?3
,X%?3,X%?4,X%?4
  130 VDU23,255,X%?5,X%?5,X%?6,X%?6,X%?7
,X%?7,X%?8,X%?8
  140 VDU254,8,10,255,11,-10*(POS=0)
  150 NEXT:ENDPROC
```

Get it right!

```
10 =     0 0 | 60 =  BF8 E | 110 = 528A 8
20 = CE37 7  | 70 =  E18 A | 120 = C94C 2
30 = DE35 C  | 80 = 16E3 2 | 130 = 21C9 F
40 = 98CC E  | 90 = 6D92 F | 140 = 729D 6
50 = 7327 6  |100 = 9ADF A | 150 = E531 9
```

Name: Text Scroller
Language: Basic
Author: Jeremy Pattman

This is a Basic routine for scrolling a text message in a window.

The main routine, PROCscroll, takes the text string to be scrolled plus the line to put the message on as arguments. It draws a box on the screen, defines a graphics window for the text and resets the graphics origin to the bottom left of this window.

The size of the box is either the length of the text string or a maximum of 30 characters.

The scrolling is done offsetting by two extra pixels each time, emphasising the apparency of the text scrolling through the box.

The main problem with the program is that putting text onto the screen using the graphics cursor is very slow so there is a large amount of flicker during the scroll.

```
   10 REM Text Scroller
   20 ON ERROR MODE7:REPORT:PRINT" at li
ne ";ERL:END
   30 MODE 1:Y%=20:READ t$
   40 PROCscroll(t$,Y%):END
   50 DEF PROCscroll(t$,Y%):LOCAL X%,u$
   60 X%=LEN(t$):IF X%>30 X%=30
   70 PROCgbox(X%,Y%):*FX21
   80 REPEAT u$=MID$(t$,1,31)
   90 FOR X%=0 TO -32 STEP -8
  100 PROCwrt(u$,X%):PROCwrt(u$,X%)
  110 NEXT:t$=MID$(t$,2)+LEFT$(t$,1)
  120 UNTIL INKEY(0)=32:ENDPROC
  130 DEF PROCgbox(X%,Y%)
  140 LOCAL A%,B%,C%,D%,O%,Z%
  150 Z%=20-X%DIV2:O%=8:A%=Z%*32
  160 B%=A%+X%*32:C%=(32-Y%)*32
  170 D%=C%+36:MOVEA%-O%,C%-O%
  180 DRAWA%-O%,D%+O%:DRAWB%+O%,D%+O%
  190 DRAWB%+O%,C%-O%:DRAWA%-O%,C%-O%
  200 VDU24,A%;C%;B%;D%;16
  210 VDU29,A%;C%;:ENDPROC
  220 DEF PROCwrt(t$,X%):VDU5
  230 GCOL3,1:MOVE X%,32:PRINT t$;
  240 VDU4,23,1,0;0;0;0;:ENDPROC
  250 DATA "This is a test message and I
 think you should read it very carefully
 . "
```

Get it right!

```
10 =     0 0 |100 = CF9C 4 |190 = 6EAB 0
20 = BC2B B  |110 = 5107 4 |200 = A650 A
30 = 70D5 A  |120 = 1593 D |210 = C3E7 5
40 = E352 9  |130 = 1137 D |220 = EB7C 0
50 = 7EE8 7  |140 = 892E 1 |230 = 1B44 F
60 = 696A 4  |150 = 92C0 4 |240 = EE75 9
70 = AADC B  |160 = 598C C |250 = E4CE 5
80 = 3CF2 2  |170 = A098 4 |
90 = A58C B  |180 = 8C37 C |
```

Name: Tab-Copy
Language: 6502
Author: Peter Lloyd

This is a handy little routine which checks the keyboard and if both the Tab and Copy keys are pressed (Tab first) the routine jumps to address &900 where another routine should be waiting – for example a screen dump routine.

The program works by using the frame sync event to enter a short piece of code which examines locations &EC and &ED in memory. These hold the current key pressed and previous (but still pressed) key values respectively. If the values indicate that Tab is pressed and Copy was pressed after it the routine switches the sync event off, enables interrupts and jumps to the routine at &900.

On return from that routine (using an RTS) the sync event is restarted and all registers reset to their normal values. The routine can be moved around as can the *execute* code position to take account of different programs' memory requirements.

The program is unlikely to work with commercial programs as these usually reset the vectors and switch off events.

```
 10 REM * TABCOPY *
 20 evntv=&0220
 30 oldev=&80
 40 execute=&900
 50 save=&FC
 60 FOR opt%=0 TO 2 STEP 2
 70 P%=&B00:[OPT opt%
 80  LDA evntv:CMP #event MOD&100
 90  BEQ done:STA oldev
100  LDA evntv+1:STA oldev+1
110  LDA #event MOD&100:STA evntv
120  LDA #event DIV&100:STA evntv+1
130 .done
140  CLI:LDX #4:LDA #&0E:JMP &FFF4
150 .event
160  PHP:PHA:TXA:PHA:TYA:PHA
170  LDA save:PHA
180  LDA &ED:BEQ exit
190  CMP #&E0:BNE exit
200  LDA &EC:BEQ exit
210  CMP #&E9:BNE exit
220  LDX #4:LDA #&0D:JSR &FFF4
230  JSR execute
240  LDX #4:LDA #&0E:JSR &FFF4
250 .exit PLA:STA save
260  PLA:TAY:PLA:TAX:PLA:PLP
270  JMP (oldev):]:NEXT
280 $&700="*SAVE TC FFFF0B00+58"
290 X%=0:Y%=&7:CALL&FFF7:END
```

Get it right!

```
 10 =    0 0|110 = 224B A|210 = 709A B
 20 = AC9E E|120 = 4481 9|220 =  F19 F
 30 = D9DE 4|130 = F743 3|230 = 1103 F
 40 =  CE6 3|140 = AC69 9|240 = D750 9
 50 = 7F30 4|150 = 8C61 0|250 = CAE6 4
 60 = 5221 F|160 = A5E9 6|260 = 9ADF E
 70 = 46D7 6|170 = 23F5 2|270 = C2FB 3
 80 = 360F 2|180 = 46A0 C|280 = 5512 0
 90 = C81D 7|190 = 5594 4|290 = 4FF2 C
100 = B9B4 E|200 = 5A5A 0|
```

Name: Day Find
Language: Basic
Author: Malcolm Girling

This program determines the day of the week from the date given. The heart of the program is FNjulian which takes the day/month/year as arguments and calculates the number of days that have passed since the 1st January 1753.

Each input is validated to be in range and the number of days in the month is calculated from the difference between the number of days to the first of the specified month and the number of days to the first of the succeeding month, thereby avoiding the need for a table of days in the month.

Since January 1st 1753 was a Monday it is quite simple to calculate the day of the week from the total days passed using the MOD7 operation indexing into the table of days in line 130.

```
  10 REM * Day Find *
  20 MODE 7:DIM wk$(6):@%=0
  30 FOR W%=0 TO 6:READ wk$(W%):NEXT
  40 REPEAT REPEAT
  50 INPUT"Year (from 1753) ",Y%
  60 UNTIL Y%>1752:REPEAT
  70 INPUT"Month (1-12) ",M%
  80 UNTIL M%>0 AND M%<13
  90 days=FNjulian(1,M%+1,Y%)-FNjulian(
1,M%,Y%)
 100 REPEAT
 110 PRINT"Day (1-"days")";
 120 INPUT D%:UNTIL D%>0 AND D%<=days
 130 PRINT'D%SPC1M%SPC1Y%" is a " wk$(F
Njulian(D%,M%,Y%)MOD7)
 140 UNTIL FALSE
 150 DATA Sunday,Monday,Tuesday,Wednesd
ay,Thursday,Friday,Saturday
 160 DEF FNjulian(D%,M%,Y%)=INT(30.57*M
%)+INT(365.25*Y%-395.25)+(Y%-1)DIV400-(Y
%-1)DIV100+D%+(M%>2)+(M%>2 AND NOT FNlea
p(Y%))
 170 DEF FNleap(Y%)=((Y%MOD400)=0)OR((Y
%MOD100)<>0)AND((Y%MOD4)=0)
```

Get it right!

```
 10 =    0 0| 70 = 7DB7 5|130 = 64E9 9
 20 = 4FCE E| 80 = 32BE 8|140 = 226C D
 30 = CB54 E| 90 = 8585 6|150 = F933 8
 40 = B1FE 8|100 = BFBA 1|160 = E69C F
 50 = 3797 F|110 = CD95 0|170 = 7D74 6
 60 = D906 D|120 = 7449 0|
```

Name: Program Environment
Language: Basic
Author: Neil McLennon

Large programs often need to alter their configuration depending on the computer they happen to be running on.

For example, a program running on a B+ might want to make use of shadow memory, or check whether the cassette or disc system is currently in use.

The three routines below allow a program to check which computer it is running on, the version of Basic in use and the current filing system.

The routines use standard operating system calls and should work correctly on any system. Although returning a string each routine also sets a global variable to the number of the appropriate version for use elsewhere in the program.

```
 10 REM * Environment *
 20 computer$=FNcomputer
 30 basicnum$=FNbasic
 40 filingsy$=FNfsys
 50 PRINT"Machine = "computer$
 60 PRINT"Basic   = "basicnum$
 70 PRINT"Filing  = "filingsy$
 80 END
 90 DEF FNfsys:LOCAL A%,Y%,S%
100 S%=USR(&FFDA)AND&F:fsys%=S%
110 IF S%=0 ="None"
120 IF S%=1 ="Tape 1200"
130 IF S%=2 ="Tape 300"
140 IF S%=3 ="Rom"
150 IF S%=4 ="Disc"
160 IF S%=5 ="Network"
170 IF S%=6 ="Teletext"
180 IF S%=7 ="IEEE"
190 IF S%=8 ="Advanced Disc"
200 IF S%=9 ="Advanced Network"
210 ="Unknown"
220 DEF FNbasic:LOCAL A%,X%,Y%
230 X%=&70:X%!0=&FFFF8015
240 A%=5:CALL &FFF1:basic%=X%?4-48
250 =STR$(basic%)
260 DEF FNcomputer
270 LOCAL C%:C%=INKEY(-256)
280 computer%=C%
290 IF C%<1 ="BBC Micro"
300 IF C%=1 ="Electron"
310 IF C%=251 ="BBC B+"
320 IF C%=252 ="BBC Master"
330 IF C%=245 ="Master Compact"
340 ="Unknown"
```

Get it right!

```
 10 =    0 0|130 = A99A 9|250 = 93EE 9
 20 = 2B84 4|140 = C516 2|260 = 2E7F E
 30 = D941 D|150 = A2BB 5|270 = 9F0D 3
 40 = 7E67 F|160 = A6F6 6|280 = 63BA 5
 50 = 4A26 5|170 = 7DD8 5|290 = 64B3 C
 60 = 7271 8|180 =  DBC 5|300 = B3E2 0
 70 = 3C96 D|190 = FA4C 8|310 = 40CD E
 80 = FD2E 6|200 =  D4C 5|320 = A283 F
 90 = CC6F 8|210 = F01C 5|330 = 248C 2
100 = B735 C|220 = A863 3|340 = F01C 8
110 = F4F7 D|230 = 6C97 C|
120 = FBBA F|240 = 3B99 5|
```

THE MICRO USER

PROGRAM Library No. 9

Compiled by Steve Turnbull

Name: Date Stamping Re-visited
Language: Wordwise Plus
Author: B.Kemp

Although the routine by Tim Arrowsmith in the August issue of *The Micro User* solves the main problem of reading the Master's clock from Wordwise Plus, the result is not very pleasing. The following segment program actually TYPEs the date into the text and does not operate automatically on printing.

The program reads the date, in the same way as the earlier program, into three variables, *D$*, *M$* and *Y$*, and then adjusts them to a tidier form before inserting them into the text. The day has *th*, *rd*, *nd* and *st* added to the number, and the month is extended from the three letter abbreviation to the full month name.

```
REM * WW+ Date v2 *
B%=0
A%=14
X%=&08
Y%=&04
CALL &FFF1
D$=""
X%=&40C
REPEAT
D$=D$+CHR$?X%
X%=X%+1
UNTIL X%=&40E
M$=""
X%=&40F
REPEAT
M$=M$+CHR$?X%
X%=X%+1
UNTIL X%=&412
Y$=""
X%=&413
REPEAT
Y$=Y$+CHR$?X%
X%=X%+1
UNTIL X%=&417
.day
D%=VALD$
D$=STR$D%
IF D%=1 THEN GOTO first
IF D%=21 THEN GOTO first
IF D%=31 THEN GOTO first
IF D%=2 THEN GOTO second
IF D%=22 THEN GOTO second
D$=D$+"th"
GOTO month
.first
D$=D$+"st"
GOTO month
.second
D$=D$+"nd"
.month
IF M$="Jan" THEN M$="January"
IF M$="Feb" THEN M$="February"
IF M$="Mar" THEN M$="March"
IF M$="Jun" THEN M$="June"
IF M$="Jul" THEN M$="July"
IF M$="Aug" THEN M$="August"
IF M$="Sep" THEN M$="September"
IF M$="Oct" THEN M$="October"
IF M$="Nov" THEN M$="November"
IF M$="Dec" THEN M$="December"
.final
TYPE D$+" "+M$+" "+Y$
DISPLAY
```

Microdis

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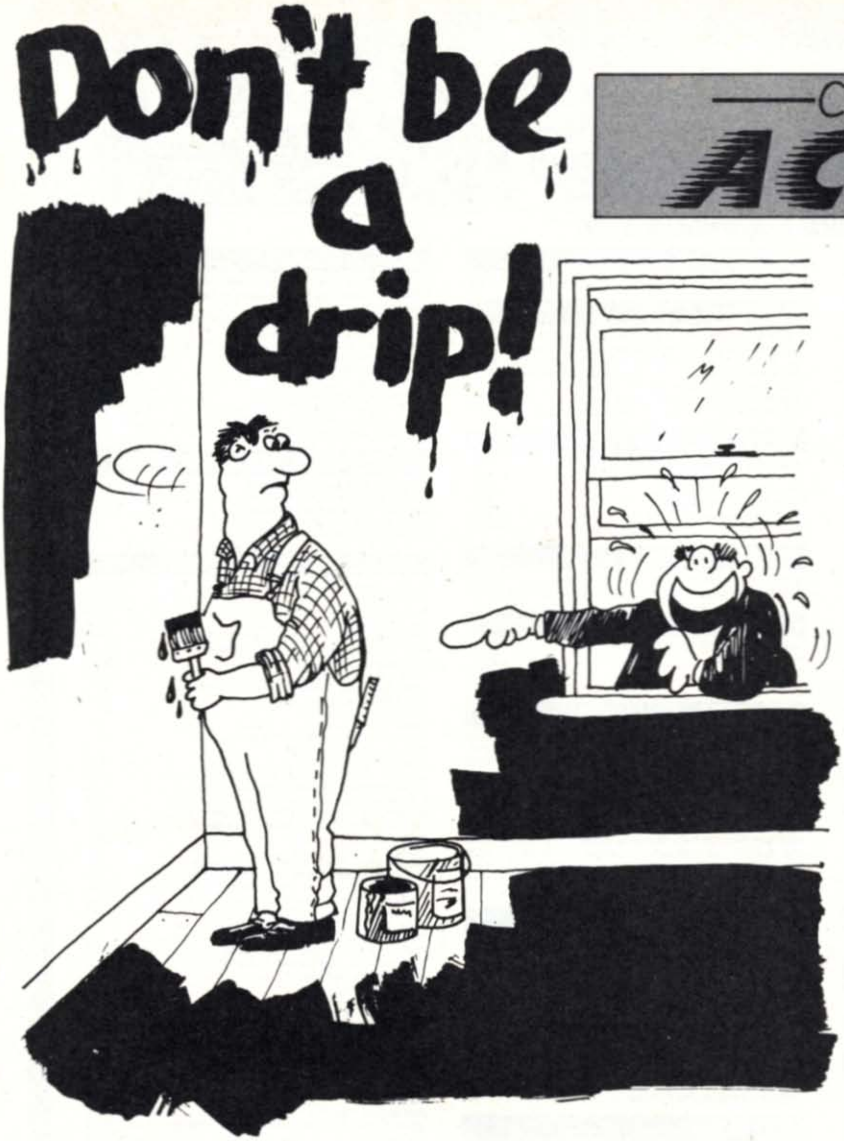
COMPUTING IN ACTION



Estimate your paint requirements

with David Willis

FIGURING out the amount of paint you need for a room is usually a matter of trial and error. You end up either buying too much, in which case you increase the pile of old but full cans in the shed, or else too little and then have to take the risk of the next can you buy not quite matching.

This month's Computing in Action takes away that guesswork and given the correct information the program can provide you with an accurate estimate of the amount of paint needed.

Type in the program make sure there are no typing errors using the Get it Right! checksums and save it.

You will need to know the cost of the paint per litre and two litre tins, plus the coverage factor. This is the area (in square metres) one litre of paint will cover and you'll find it on the can. Finally you need the number of coats that will be applied.

The next stage is to enter the widths and lengths of all the rectangular areas to be painted. For instance, in a room where you are painting the woodwork only you need the complete length of the skirting board plus its height (add a little for shaping) in addition there is the door, its frame, the flat portions of the windows and so on.

We can't guarantee complete accuracy, but the program can certainly help reduce the guesswork.

```
   10 REM Computing in Action
   20 REM Paint Calculator
   30 REM by David Willis
   40 REM (c) The Micro User
   50 ON ERROR MODE7:PROCerr:END
   60 MODE1:@%=&20205:PROCoff
   70 PROCbx("Paint Calculator",1)
   80 C1=FNbx("Price: 1 litre tin",5,.5,
5):C2=FNbx("Price: 2 litre tin",9,1,10)
   90 Co=FNbx("Coverage factor",13,5,20)
  100 Ct=FNbx("Number of coats",17,1,3):
PROCclr(4)
  110 N%=FNbx("Number of areas",5,1,50)
  120 T=0:FOR A%=1 TO N%
  130 PROCbx("Area "+STR$(A%),9)
  140 H=FNbx("Height (m)",13,0.1,10)
  150 W=FNbx("Width (m)",17,0.1,10)
  160 T=T+H*W:NEXT:PROCclr(4)
  170 PROCbx("Total area is "+STR$(T)+"
sq.m.",5):P%=(T*Ct/Co)+1
  180 PROCbx("Paint needed is "+STR$(P%)
+" litres",9):L2%=P%DIV2:L1%=P%MOD2
  190 PROCg(2,4,3,36,17,12):P2=C2*L2%
  200 PROCg(1,4,3,36,17,16):P1=C1*L1%
  210 VDU28,8,28,34,17
  220 PRINT L2%" x 2 litre = £"P2
  230 PRINT L1%" x 1 litre = £"P1
  240 PRINTTAB(19)"-----"
  250 PRINTTAB(4)"Cost of paint £"P1+P2,
TAB(19)"=====":PROCclr(4):RUN
  260 DEFPROCclr(Y%)
  270 PROCbx("Press SPACE",27)
  280 REPEATUNTILGET=32:COLOUR 128
  290 VDU28,0,30,39,Y%,12,26:ENDPROC
  300 DEFFNbx(t$,Y%,lo,hi):LOCAL X
  310 t$=t$+"?"+STRING$(6," ")
  320 PROCon:REPEAT PROCbx(t$,Y%)
  330 VDU8,8,8,8,8,8:INPUT""X;
  340 UNTIL X>=lo AND X<=hi
  350 PROCoff:VDU26:COLOUR128:=X
  360 DEFPROCbx(t$,Y%):PROCb(LEN(t$),Y%)
  370 PRINTTAB(0,0)t$;:ENDPROC
  380 DEFPROCb(X%,Y%):LOCAL J%,K%
  390 J%=20-X%DIV2:K%=J%+X%
  400 PROCg(2,J%-1,29-Y%,K%+1,33-Y%,12)
  410 PROCg(1,J%-1,29-Y%,K%+1,33-Y%,16)
  420 VDU28,J%,Y%+1,K%,Y%:COLOUR129
  430 ENDPROC
  440 DEFPROCg(C%,Q%,R%,S%,T%,O%):GCOL0,
128+C%:VDU24,Q%*32+O%;R%*32+O%;S%*32-O%;
T%*32-O%;16:ENDPROC
  450 DEFPROCon:LOCALB%:B%=1
  460 DEFPROCoff:LOCALB%:B%=0
  470 VDU23,1,B%;0;0;0;0;:ENDPROC
  480 DEFPROCerr:@%=10:PROCon:REPORT
  490 PRINT" at line ";ERL:ENDPROC
```

Get it right!

```
 10 =    0 0
 20 =    0 0
 30 =    0 0
 40 =    0 0
 50 = 5779 9
 60 = 7ED4 8
 70 =   F5 B
 80 = 706B F
 90 = 2915 E
100 = 9FC7 5
110 =  370 F
120 = 6ED9 7
130 = D076 5
140 = C94C 6
150 = 8481 2
160 = 20A1 5
170 = 6FAF 1
180 = AC96 8
190 = 2A9E 8
200 = 9A62 F
210 = 9F8C D
220 =  7E1 3
230 = E4F4 7
240 = 92C7 1
250 = 1389 F
260 = 7761 F
270 = D3AC F
280 = 50E7 F
290 =  212 8
300 = 1FA9 3
310 = E91D F
320 = 9113 F
330 = F18C D
340 = 5D63 B
350 = EB16 0
360 =  537 D
370 = 7B04 5
380 = C1FC 3
390 = E971 7
400 = E286 9
410 = 11E8 4
420 = EDA5 9
430 = ED0F F
440 = F509 1
450 = 4D34 D
460 = DEC2 9
470 = 1149 1
480 = BFA6 B
490 = 7580 7
```

M1
M10
1
A405
A5183
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21a
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MacDougall 286 AT 512k 10mz/20mb HD/mono monitor	£999

TANDON

PCA 20mb Hard Disk AT (1mb RAM Keyboard DOS Monitor)	£1345
PCA 30mb Hard Disk AT (1mb RAM Keyboard DOS Monitor)	£1569
PCA 40mb Hard Disk AT (1mb RAM Keyboard DOS Monitor)	£1789
PCA 70mb Hard Disk AT (1mb RAM Keyboard DOS Monitor)	£2145
Target 20mb Mini AT (Complete mono system)	£1599
Target 40mb Mini AT (Complete mono system)	£1814
PAC-286 (complete EGA AT with removable 32mb hard disk)	£1996

OLIVETTI PC's

Olivetti M28 AT Compatible - 20mb Hard Disk	£1831
Olivetti M240 Double Floppy	£759
Olivetti M240 20mb hard disk)	£1092
Olivetti Mono Monitor for M240	£167
Olivetti 102-key Keyboard for M240	£120
Olivetti M380 40mb hard disk Compact System	£3307

SHARP PORTABLES

Sharp PC7100 20mb Hard Disk SuperTwist Screen	£1399
Sharp PC7200 (20mb 80286 AT Super Twist & Super Fast!)	£2099

TOSHIBA

Toshiba T3100 20mb 80286 Portable	£2790
Toshiba T1100 Plus	£1271
Toshiba T1000	£810
Toshiba T1200	£1946

MONITORS

Eizo ER8042S 14in Ultra-High Res EGA Colour Monitor	£445
ADI 14in Mono Monitor with Tilt/Swivel Stand	£120
NEC Multi-sync EGA monitor	£489

ATARI

Atari Expandable PC Twin Drive Mono (8088/2)	£579
Atari Expandable PC 20mb Hard Disk Mono (8088/2)	£799
Atari 520STFM 512k RAM, disk drive, mouse	£250
Atari 1040STF 1mb RAM, disk drive, mouse, no monitor	£380
Atari 1040STF with Mono Monitor, 1mb RAM, disk drive	£469
Atari 1040STF with Atari SC1224 Colour Monitor	£670
Atari SH204 20mb Hard Disk Drive	£478

ATARI TOP SELLING SOFTWARE

Cyber Studio Cad 3D ver 2.0 - It's here at last!	£64
Flight Simulator II - Very Realistic Best Seller	£36
VIP Professional (Lotus Clone Gem Version)	£149
Metacomco Lattice C Compiler	£71
First Word Plus - Word Processor with Graphics	£62

CATS 'N' MICE

Mouse Systems Mouse with Pop-Up Menus & PC Paint	£140
Mouse Systems Mouse with Pop-Up Menus Only	£125
Microsoft Bus or Serial Mouse - Don't forget the cat!	£132
Logitech Logimouse C7	£77
Logitech Logimouse Plus Package	£89

DISKETTES

Computer Express 5.25in DS/DD 48tpi disks	£1.00 each
Computer Express 5.25in DS/DD 96tpi Hi-Density	£1.65 each
Computer Express Branded 3.5in DS/DD diskettes	£1.99 each
Un-branded Verbatim 3.5in SS/DD diskettes	£1.15 each

COMMUNICATIONS

Miracle WS4000 V21-V23 Modem	£139
Miracle WS3000 V22 Professional Modem	£385
Sage Chitchat Comms Pack (Modem/Software/Cable)	£199
Crosstalk IV Comms Software	£93
Sage Chitchat Comms Software	£71
One-To-One Electronic Mail Subscription	£20
RS232 serial modem cable	£15

HARD DISKS

Dysan/Western Digital 20mb File Card	£279
Miniscribe 32mb Scribecard Hard Disk Card	£295
Western Digital 32mb FileCard (with X-Tree software)	£299
Seagate 20mb Hard Disk with WD controller and cables	£225
Plus HardCard 20mb	£525
Plus HardCard 40mb (the quality leader)	£850

SPECIAL OFFERS

LX-86 Auto Sheet Feed	£39
Olivetti M24 20mb Hard Disk complete mono system	£1199
M24SP Complete System (Monitor/Keyboard/DOS)	£1399

ADD-ON BOARDS

AST SixPack Plus 64k memory Multifunction Card	£165
Qubie SixShooter Multifunction Card 64k memory	£125
Intel AboveBoard with 0k installed	£199
Everex Mini Magic Ram Expansion Card (384K)	£117
Hercules Graphics/Graphics Plus Card	£179
Everex EverGraphics Plus (Clone Hercules Card)	£95
Eizo Auto-Switch EGA Card	£199
Paradise Auto-Switch EGA Card	£219
AST Rampage	£200
AST 3720 Terminal Emulation Card	£649
AST 5251 Model 12 Remote Emulation Card	£525
AST SixPack Premium 256k Clock Parallel & Serial	£330
AST SixPack Premium 1mb EMS daughter board	£150

CHIPS, CO-PROCESSOR AND DRAM

64k dRAM chips (nine to make 64k)	£1.15 each
256k dRAM chips (nine to make 256k) 150 N.S.	£3.00 each
Intel 8087 5mz Maths Co-Processor	£95
Intel 8087-2 8mz Maths Co-Processor	£135
Intel 80287-8 Maths Co-Processor	£185

IBM-COMPATIBLE SOFTWARE

WordStar 2000 Plus release 2	£229
WordStar 3.4	£149
WordStar Professional Version 4	£193
WordStar 2000 Plus	£269
Word Perfect ver 4.2 - The Number 1 WP Package	£219
Microsoft Word ver 3 - Number 2 WP Package	£249
Multimate ver 3.31	£189
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Symphony version 1.2 (Latest Version)	£318
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Microsoft Flight Simulator - Don't crash!	£39
Microsoft Quick Basic version 3 - The Ultimate Basic	£55
Funk Software Sideways	£40
Living Videotext Ready!	£50
Borland Turbo Lightening	£47
Microsoft Windows	£59
Norton Utilities 4 - Every user need this one!	£52
Norton Commander - Control program for power users!	£35
Ventura Desk Top Publisher	£527
Freelance Plus	£266
Delta Professional	£319
Ansa Paradox II - Multi-User Database!	£289
Cardbox Plus	£225
Ashton-Tate Rapid File	£199
dBase III Plus - Best Selling Professional Database	£349
FoxBase Plus	£269

LOW-COST SOFTWARE

VP Planner by Paperback Software - Best Seller!	£61
VP Info (dBASE II Clone)	£62
VP Expert	£75
Borland Sidekick - The Original Co-Resident Process!	£49
Borland Turbo C - C How You Like This!	£65
Borland Turbo Pascal - The Classic Borland Product	£47
Borland Turbo Basic	£55
Sage Bookeeper	£75
Sage Retrieve Database	£71
Sage PC Planner Spreadsheet (Lotus Clone)	£71
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Amstrad Amstrad Reflex	£60
Precision Software Superbase Personal	£75
Migent Ability - Top Integrated Package	£40
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Words & Figures - Lotus 123 v1 Clone with WP	£80

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CEEFAX Guide

P298 CEEFAX 797 Fri 20 Mar 11:34/53
1/36

YOU ARE WATCHING
ITEMS OF NEWS AND INFORMATION FROM
CEEFAX
THE BBC'S TELETEXT SERVICE

The full service offers several hundred pages and is available to anyone with a suitably-equipped television set.

Software is currently transmitted for a period of one week. Downloading can take place from Friday evening to the following Thursday evening. As the updating takes place on a Friday, we do not advise attempting to download software between 9am and 7pm on Fridays. The program details given are provisional.

October 2 to 8

KeyEcho
Talking
DemoKey
Speller

Let your micro speak! This machine-code routine will read each key to you as it is pressed. A spelling test game is also included. (Requires the Acorn speech system)

DateInf
Datebas
Dater

Automatically date and time stamp files when they are saved from a BBC Master.

TextRd

Read any text file from any source (including all the telesoftware text files) from either tape or disc.

OSBITS

The first in the repeated OSBITS series guiding you through the complexities of Assembler language programming on the BBC Micro. This first module uncovers some of the history of computing by way of an introduction to this very popular 26-part course.

Rhondo

The classic shooting gallery game from the pages of the February issue of *The Micro User*.

Review

Continuing our service offering reviews of educational software and hardware for schools.

Notes

Teachers' notes for a variety of BBC TV and radio educational programmes.

October 9 to 15

TVdiary
TVprogs

Keep a record of the TV programmes you want to watch or record. This software will offer you the Ceefax TV listings for you to make your selections. Programmes are sorted into date and time order, and any overlapping presentations are indicated. A schedule for you to set your video recorder is also listed.

Astro
Ast/Inf

Convert between equatorial and galactic coordinates, using three of the more common methods of mapping the heavens.

T/OSB01
B/OSB01

Part one of our OSBITS course guiding you through the intricacies of machine code programming.

PerCent

Calculates mark-up rates and profit margins and gives an explanation.

Dino

All action arcade classic from the March issue of *The Micro User*.

Review

Continuing our service offering reviews of educational software and hardware for schools.

Notes

Teachers' notes for a variety of BBC TV and radio educational programmes.

October 16 to 22

Snap
General
Use
MoveUp

Save a snapshot of your computer's memory at regular intervals. The package includes a six-page instructional guide.

T/SWR00
B/SWR00

The start of a new programming series dealing with the use of Sideways ram (SWR). Our new guide aims to explain what SWR is and how to write software to make use of its facilities. Many example programs and routines will be included in the course.

T/OSB02
B/OSB02

The second module in our series designed to explain the techniques of assembly language programming.

Diamond Quest

A great arcade adventure from the pages of the July issue of *The Micro User*.

Review

Continuing our service offering reviews of educational software and hardware for schools.

Notes

Teachers' notes for a variety of BBC TV and radio educational programmes.

October 23 to 29

B–Ships
B/Ship

The game of Battleships, fought between you and the computer or between two players.

T/SWR01
B/SWR01

Following last week's introduction, this is the first module in our guide for programmers explaining how to use Sideways ram.

AuLd

Download all the telesoftware files you want from Ceefax without the need to return to the computer between files.

T/OSB03
B/OSB13

Part 3 of the OSBITS guide to assembler language programming on the BBC Micro.

Soccer Manager

Accept the challenge of managing a football game with this addictive game from the pages of *The Micro User*.

Review

Continuing our service offering reviews of educational software and hardware for schools.

Notes

Teachers' notes for a variety of BBC TV and radio educational programmes.

October 30 to November 4

FXHelp
Help
FXdata
Hlp/Inf

Create your own individual "Help" file of details commonly used commands and the information will be available at the press of a button whenever you want it.

T/SWR02
B/SWR02

The second module of our important new series explaining the mysteries of using Sideways ram.

T/ATS04

Module 4 in our repeated series helping you get to grips with BBC Assembler Language.

Duck's Dinner

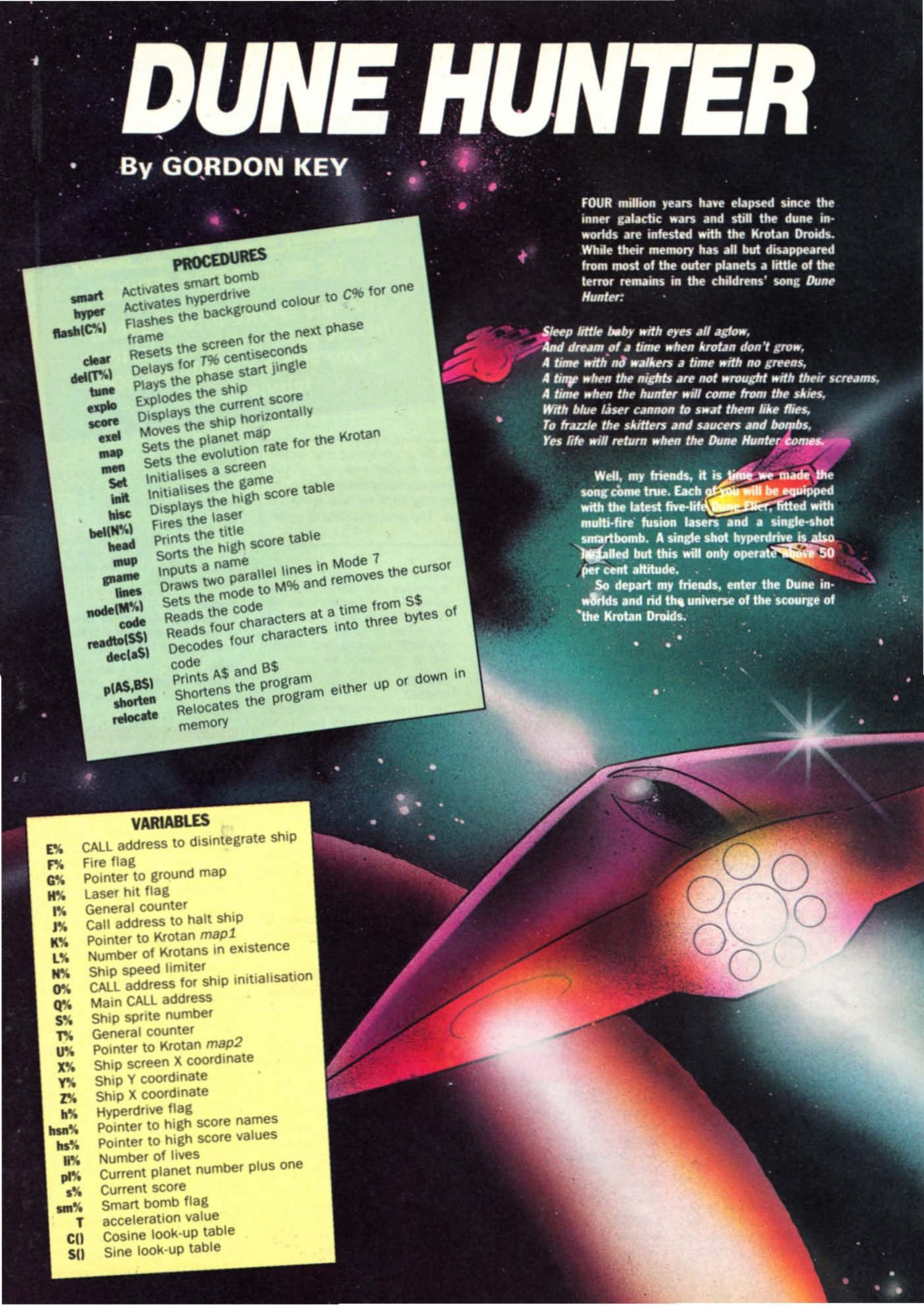
Guide Daffy Duck around the skull maze to find food in this game from the pages of the May issue of *The Micro User*.

Review

Continuing our service offering reviews of educational software and hardware for schools.

Notes

Teachers' notes for a variety of BBC TV and radio educational programmes.



DUNE HUNTER

By GORDON KEY

FOUR million years have elapsed since the inner galactic wars and still the dune in-worlds are infested with the Krotan Droids. While their memory has all but disappeared from most of the outer planets a little of the terror remains in the childrens' song *Dune Hunter:*

Sleep little baby with eyes all aglow,
And dream of a time when krotan don't grow,
A time with no walkers a time with no greens,
A time when the nights are not wrought with their screams,
A time when the hunter will come from the skies,
With blue laser cannon to swat them like flies,
To frazzle the skitters and saucers and bombs,
Yes life will return when the Dune Hunter comes.

Well, my friends, it is time we made the song come true. Each of you will be equipped with the latest five-life Dune Flier, fitted with multi-fire fusion lasers and a single-shot smartbomb. A single shot hyperdrive is also installed but this will only operate above 50 per cent altitude.

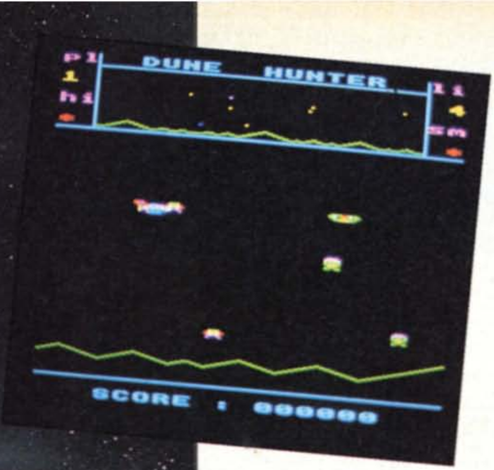
So depart my friends, enter the Dune in-worlds and rid the universe of the scourge of the Krotan Droids.

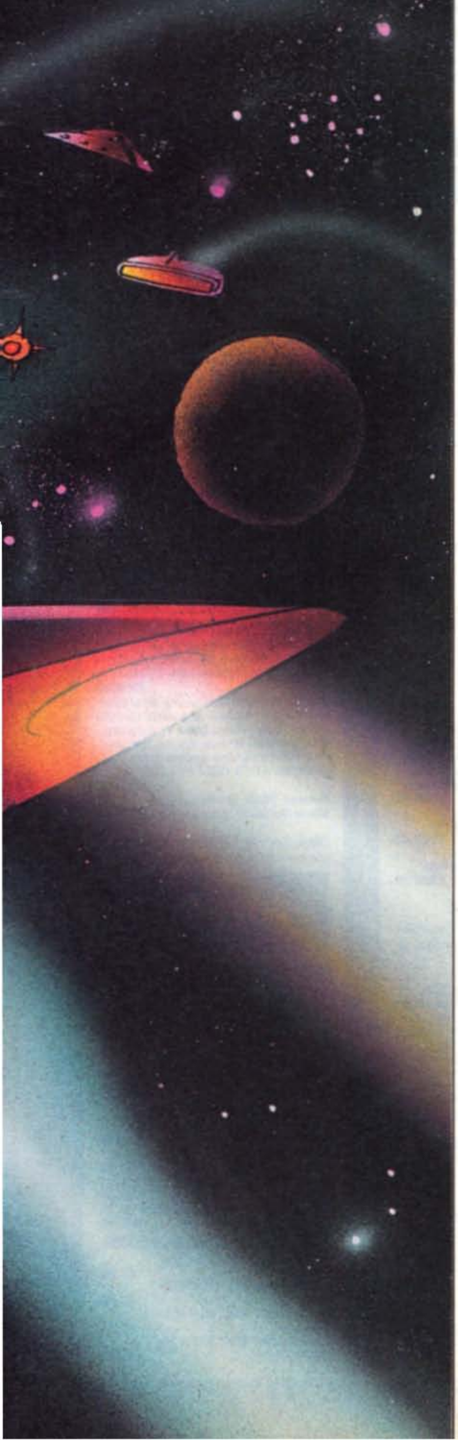
PROCEDURES

smart	Activates smart bomb
hyper	Activates hyperdrive
flash(C%)	Flashes the background colour to *C%* for one frame
clear	Resets the screen for the next phase
del(T%)	Delays for *T%* centiseconds
tune	Plays the phase start jingle
explo	Explodes the ship
score	Displays the current score
exel	Moves the ship horizontally
map	Sets the planet map
men	Sets the evolution rate for the Krotan
Set	Initialises a screen
init	Initialises the game
hisc	Displays the high score table
bel(N%)	Fires the laser
head	Prints the title
mup	Sorts the high score table
gname	Inputs a name
lines	Draws two parallel lines in Mode 7
node(M%)	Sets the mode to M% and removes the cursor
code	Reads the code
readto(S$)	Reads four characters at a time from S$
dec(a$)	Decodes four characters into three bytes of code
p(A$,B$)	Prints A$ and B$
shorten	Shortens the program
relocate	Relocates the program either up or down in memory

VARIABLES

E%	CALL address to disintegrate ship
F%	Fire flag
G%	Pointer to ground map
H%	Laser hit flag
I%	General counter
J%	Call address to halt ship
K%	Pointer to Krotan *map1*
L%	Number of Krotans in existence
N%	Ship speed limiter
O%	CALL address for ship initialisation
Q%	Main CALL address
S%	Ship sprite number
T%	General counter
U%	Pointer to Krotan *map2*
X%	Ship screen X coordinate
Y%	Ship Y coordinate
Z%	Ship X coordinate
h%	Hyperdrive flag
hsn%	Pointer to high score names
hs%	Pointer to high score values
li%	Number of lives
pl%	Current planet number plus one
s%	Current score
sm%	Smart bomb flag
T	acceleration value
C()	Cosine look-up table
S()	Sine look-up table





```
   10 REM *     DUNE HUNTER      *
   20 REM *       G.J.KEY        *
   30 REM * (c) The Micro User *
   40 REM
   50 *FX3
   60 IFTOP>&3000THENMODE7:PROCshorten
   70 MODE 2
   80 PROCinit
   90 REPEAT:PROChisc
  100 REPEAT:PROCmap
  110 REPEAT:PROCset:PROCtune
  120 REPEAT:PROCexel
  130 IFINKEY-99 IFF%=0 F%=2
  140 IFINKEY-105Y%=Y%+4
  150 IFINKEY-73Y%=Y%-4
  160 IFINKEY-97PROCsmart
  170 IFINKEY-85PROChyper
  180 ?&80=T:CALLQ%
  190 IFH%PROCscore
  200 UNTILC%ORL%=0
  210 IFL%=0:PROCclear:ELSE:PROCexplo
  220 UNTILli%=0ORL%=0:pl%=pl%+1
  230 UNTILli%=0:CALL&1455
  240 UNTILFALSE
  250 DEFPROCsmart
  260 IFNOTsm%SOUND&10,-15,2,4:ENDPROC
  270 sm%=0:LOCALT%:FORT%=0TO7
  280 IFT%?K%>6IF(((T%?&13EF)+?&83)AND&F
F)<76THENT%?K%=6:SOUND&10,1,6,1
  290 NEXT:PRINTTAB(19,6)SPC1
  300 ENDPROC
  310 DEFPROChyper
  320 IFNOTh%ORY%>140SOUND0,-15,2,2:ENDP
ROC
  330 PROCflash(4)
  340 h%=FALSE:LOCALT%,I%,x%:T%=3
  350 x%=0:I%=20+RND(20):REPEAT
  360 ?&80=T%*SGN(S%*2-1):CALLQ%
  370 T%=T%+1:x%=(x%+1)AND&FF
  380 UNTILT%>I%ANDx%=&80:?&80=0
  390 PRINTTAB(0,6)SPC1
  400 ENDPROC
  410 DEFPROCflash(C%)
  420 VDU19,0,C%;0;:*FX19
  430 *FX19
  440 VDU19,0,0;0;
  450 ENDPROC
  460 DEFPROCclear
  470 CALL&1455:s%=s%+500*pl%:PROCscore
  480 VDU24,0;72;1279;788;16
  490 COLOUR3:PRINTTAB(3,15)"PHASE ";pl%
-1;" COMPLETE"
  500 COLOUR7:PRINTTAB(3,17)"PREPARE TO
ENTER"
  510 COLOUR6:PRINTTAB(7,19)"PHASE ";pl%
  520 FORT%=1TO8:SOUND&101,0,0,3:SOUND&1
02,2,70+T%*15,3:NEXT
  530 VDU26:PROCdel(200)
  540 ENDPROC
  550 DEFPROCdel(T%)
  560 TIME=0:REPEATUNTILTIME>T%
  570 ENDPROC
  580 DEFPROCtune
  590 *FX15
  600 RESTORE:REPEAT
  610 READT%,D%
  620 IFT%>0:FORI%=1TO3:SOUNDI%,4,T%,D%:
PROCdel(2):NEXT
  630 UNTILT%=0ANDD%=0
  640 ENDPROC
  650 DEFPROCexplo
  660 PROCflash(1)
  670 li%=li%-1:IFF%<>0:?&80=0:CALLQ%
  680 PROCflash(3)
  690 CALL&1130:CALLE%:i%=1:l%=-15:SOUND
0,l%,6,15
  700 VDU24,0;72;1279;788;
  710 VDU29,X%*16+64;1024-Y%*4;
  720 PROCflash(7):GCOL0,3:R%=0:r%=30
  730 o%=0:REPEAT:FORI%=0TO19
  740 PLOT69,C(I%)*R%,S(I%)*R%-o%
  750 NEXT:R%=R%+r%:r%=r%*.98:o%=o%+16
  760 i%=i%+1:IFi%=5CALLJ%:SOUND&10,l%,4
,15:i%=0:l%=l%+3
  770 UNTILr%=1:VDU28,0,30,19,8,16,26
  780 ENDPROC
  790 DEFPROCscore
  800 COLOUR6:s%=s%+H%*5
  810 PRINTTAB(17-LENSTR$s%,31);s%;
  820 ENDPROC
  830 DEFPROCexel
  840 LOCALf%
  850 IFINKEY-66IFT>-N%f%=TRUE:S%=0:T=T-
.5:IFT>TRUE ANDT<1 T=TRUE
  860 IFINKEY-21IFT<N%f%=TRUE:S%=1:T=T+.5
:IFT<1ANDT>TRUE T=1
  870 IFf%ENDPROC
  880 T=T-SGNT*.2
  890 ENDPROC
  900 DEFPROCmap
  910 !&13DE=0:!&13E2=0
  920 PROCmen:CLS:COLOUR5
  930 PRINTTAB(0,0)"pl"TAB(18,0)"li"TAB(
0,4)"hi"TAB(18,4)"sm"
  940 COLOUR6:PRINTTAB(4,0)"DUNE  HUNTER
"
  950 GCOL0,6
  960 MOVE128,984:DRAW1154,984
  970 MOVE0,794:DRAW1280,794
  980 MOVE120,794:DRAW120,1023
  990 MOVE1154,794:DRAW1154,1023
 1000 MOVE0,68:DRAW1279,68
 1010 PRINTTAB(3,31)"SCORE : 000000";:PR
OCscore
 1020 VDU19,2,pl%+(pl%=3)*2;0;
 1030 A%=220:B%=1:R%=10
 1040 FORT%=0TO127
 1050 T%?G%=A%:?(G%+&FF-T%)=A%
 1060 A%=A%+B%:IFA%>222ORA%<160B%=-B%
 1070 R%=R%-1:IFR%=0B%=-B%:R%=RND(26)+4
 1080 NEXT:GCOL0,2
 1090 FORX%=0TO255:?&70=X%-80
 1100 IFX%MOD2PLOT69,128+X%*4,&300+(G%?(
?&70))EOR255
 1110 NEXT:L%=0:r%=30
```

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TWILLSTAR COMPUTERS LTD

Computers

ARCHIMEDES

HIGH PERFORMANCE COMPUTER SYSTEMS

Archimedes systems use the Arthur operating system, a new version of the BBC Micro operationg system. BBC BASIC is replaced by a new extended version, BBC BASIC V. The speed and power of Archimedes allows the programmer to exploit RISC architecture with a range of high level languages for scientific engineering and business uses. In addition to BBC BASIC V, Acornsoft's development languages include C, ISO-Pascal, FORTRAN, Lisp and Prolog. The Acornsoft Software Developers Toolbox provides utilities to simplify program development and debugging; while an extensive Software Developer's Debug Tool facilitates high level leanguage deelopment in C, Pascal or FORTRAN. All Archimedes Systems have a floating point emulator as standard. On the 400 series, complex mathmetical calculations can be further enhanced by the addition of a floating point unit (FPU). All machines have feature: 32 bit RISC technology – BM enhanced style keyboard with 3 button mouse – BBC Micro style operating system (Arthur) – BBC BASIC V – interfaces; printer, serial, monitor, stereo sound – ECONET plug-in option – a variety of podules can be fitted. Archimedes is an open system and its flexibility is achieved by fitting any of the following podules (peripheral modules) via a back plane: hard disk controller (300 series only) – ROM extension board – MIDI music interface – MS-DOS co-processor – SCSI – hardware floating point unit – Ethernet podule.

THE 300 SERIES Consists of two models, Archimedes 305 0.5 Mbyte of RAM and Archimedes 310 with 1 Mbyte of RAM. Both machines have a 512 Kbyte ROM and a 1 Mbyte (unformatted) 3½" disc drive.

THE 400 SERIES Offers increased expansion capabilities. The Archimedes 410 has 1 Mbyte of RAM. 1 Mbyte (unformatted) 3½" disc drive, a hardware floating point unit option, a co-processor bus, a hard disk controller, a four socket back plane, 512 Kbytes of ROM. At the top of the range is Archimedes 440. This machine possesses all the features of the 410 as standard, with the adoption of 4 Mbytes o: RAM and a 20 Mbyte hard disk.

305 BASE AKB10	918.85
305 & mono monitor	976.35
305 & colour monitor	1148.85
310 BASE AKB15	1006.25
310 & mono monitor	1063.75
310 & colour monitor	1236.25
410 BASE AKB26	1608.85
410 & mono monitor	1666.35
410 & colour monitor	1838.85
440 BASE AKB20	2643.85
440 & mono monitor	2701.35
440 & colour monitor	2873.85
Archimedes/Master Econet	49.99
0.5 MB RAM	102.35
Floppy disk	143.75
20 Mbyte hard disk & podule (300 only)	573.85
Podule Backplane	40.25
ROM Podule	TBA
I/O Podule	TBA
MIDI add-on to I/O	TBA
A series reference manual	£19.95

MASTER 128

Complete With Internal Software	£399.00
Master Turbo Upgrade	£113.95
Master Econet Module	£46.00
Master ET	£349.00
Master 512 Upgrade	£217.35

The Master 512 upgrade board incorporates the Intel 80186 processor, plus 512K bytes of RAM. Digital Research DOS+, which is copatible with both MS/DOS version 2, and CP/M 86, allows you to run a large proportion of the most useful programs available. A dual 80 track disc drive is required to run programs on the 512. Provided free with 512 upgrade board are three GEM packages, GEM Desk Top, GEM Write, GEM Paint.

UNIVERSAL SECOND PROCESSOR

This allows you to connect co-processor boards designed for the Master Series to your BBC Models B or B+. Fitting a Turbo board boosts the BBC's already rapid performance to twice the speed of the standard processor. Fitting the 512 co-processor converts the BBC micro into a 16 bit machine, opening up new possibilities within the world of MS-DOS and CP/M 86. **£86.25**

Eprom Cartridge	£14.95
Reference Manual Part I	£14.95
Reference Manual Part 2	£14.95
Acorn Teletext Receiver.	£108.00

FILESTORE

Filestore provides shared access to file and printer services on Econet. The filestore consists of two units – a dual 3.5 inch floppy disc unit 1.2 Mbytes of storage (Filestore EO1) which can be expanded with a high performance 20 Mbyte Winchester disk drive unit(Filestore E20).

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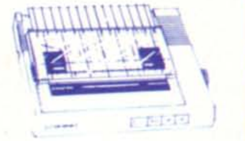

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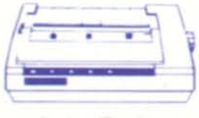

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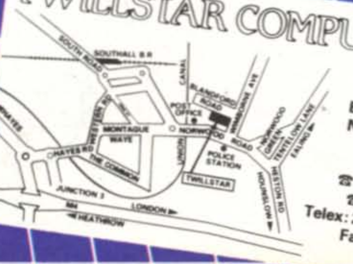

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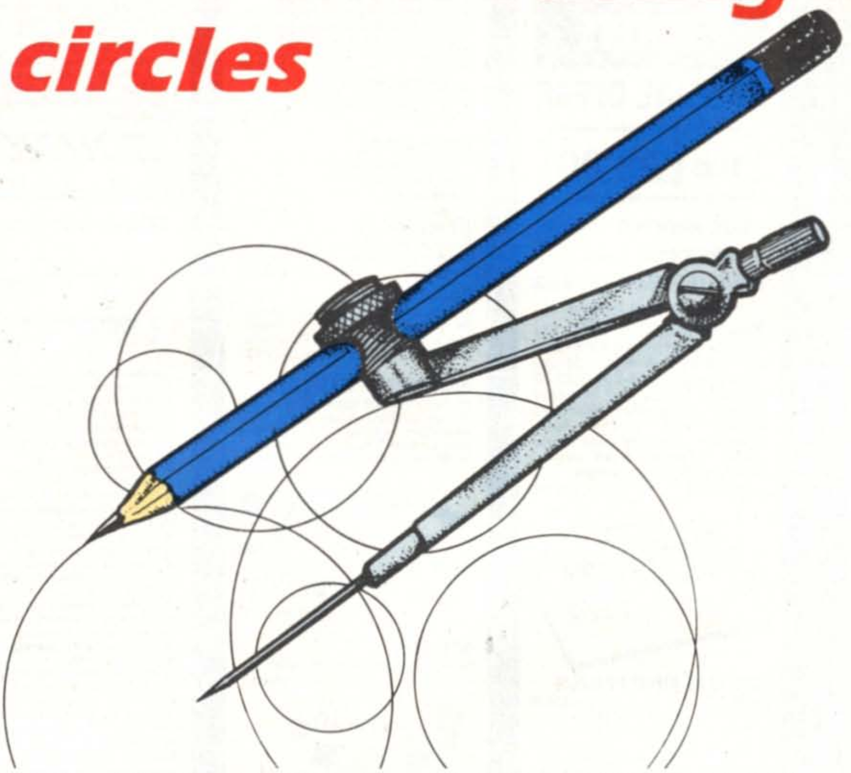
Ever decreasing circles

Steve Turnbull shows the way to faster circle drawing

> *"I am in the process of learning machine code and would like to draw a circle with a command *CIRCLE. I know how to create new * commands, but could you tell me the machine code for SIN(RAD(radius)) and COS(RAD(radius))?"* – **Robin Patenall, Egham, Surrey**



STARTING from basics, the simplest way to draw a circle is shown in Program I:

```
10 REM Program I
20 MODE 4
30 OX% = 500
40 OY% = 500
50 R% = 200
60 FOR A% = 0 TO 360
70 X% = R%*SIN(RAD(A%))
80 Y% = R%*COS(RAD(A%))
90 PLOT 69,X%+OX%,Y%+OY%
100 NEXT
```

Program I

This is probably the slowest circle drawing technique, short of actually putting in delay loops. It works by calculating the position of a dot on the circumference at a particular angle and then plots that position.

For small circles you don't need to calculate the full 360 degrees, so adding a step function can speed it up:

```
10 REM Program II
20 MODE 4
30 OX% = 500
40 OY% = 500
50 R% = 200
60 S = 60/R%*PI
70 FOR A = 0 TO 360 STEP S
80 X% = R%*SIN(RAD(A))
90 Y% = R%*COS(RAD(A))
100 PLOT 69,X%+OX%,Y%+OY%
110 NEXT
```

Program II

The value of *S* is calculated so that only the least number of dots needed to form an unbroken circle are plotted, this is slow for large circles and fast for small circles.

The next step in speeding things up involves a bit of a logical jump, and has to do with the fact that circles are symmetrical. Look at Figure Ia. This shows a point on a circle, then Figure Ib shows the mirror image of this position in the X axis. Ic shows the mirror image in the X and Y axes, and Figure Id shows the final mirror in both the axes.

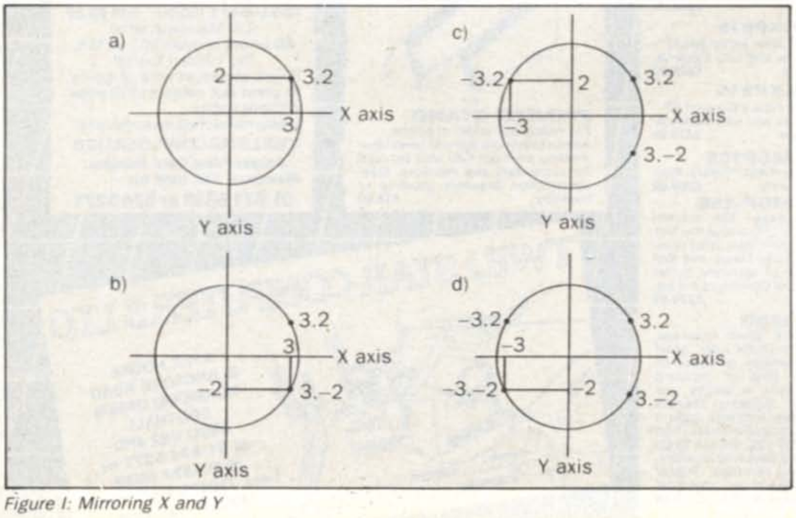


Figure I: Mirroring X and Y

Notice that the numbers are the same – it's just the pluses and minuses that differ. This means that if we calculate the X and Y positions of the circumference of a circle for just one quarter of the circle, we can create the other three quarters by mirroring the values. This reduces the amount of work done by 75%. Program III shows this in action

```
10 REM Program III
20 MODE 4
30 OX% = 500
40 OY% = 500
50 R% = 200
60 S = 60/R%*PI
70 FOR A = 0 TO 90 STEP S
80 X% = R%*SIN(RAD(A))
90 Y% = R%*COS(RAD(A))
100 PROCplot(X%,Y%)
110 PROCplot(-X%,Y%)
120 PROCplot(X%,-Y%)
130 PROCplot(-X%,-Y%)
140 NEXT
150 END
160 DEF PROCplot(X%,Y%)
170 PLOT 69,X%+OX%,Y%+OY%
180 ENDPROC
```

Program III

Notice how we only calculate angles from 0 to 90 because this covers the

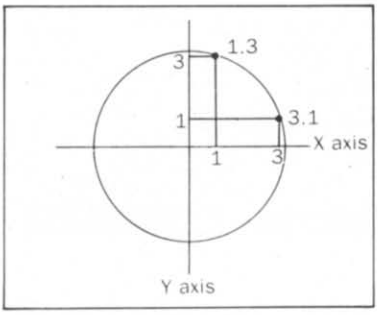


Figure II: Swapping X and Y

quarter of the circle needed.

There is one more speed up that we can do in this way. Figure II shows that apart from just mirroring the X and Y positions, if we also swap the values X becomes Y and Y becomes X. So we can halve the amount of work again:

```
 10 REM Program IV
 20 MODE 4
 30 OX% = 500
 40 OY% = 500
 50 R% = 200
 60 S = 60/R%*PI
 70 FOR A = 0 TO 45 STEP S
 80 X% = R%*SIN(RAD(A))
 90 Y% = R%*COS(RAD(A))
100 PROCplot(X%,Y%)
110 PROCplot(-X%,Y%)
120 PROCplot(X%,-Y%)
130 PROCplot(-X%,-Y%)
140 NEXT
150 END
160 DEF PROCplot(X%,Y%)
170 PLOT 69,X%+OX%,Y%+OY%
180 PLOT 69,Y%+OX%,X%+OY%
190 ENDPROC
```

Program IV

So far I haven't actually answered the question because I'm still using SIN and COS. While it is possible to use trigonometric functions in machine code it is inefficient and unnecessary. It isin fact possible to draw circles without using any trigonometric functions at all.

Program V shows the Basic version of the non-trigonometric circle drawing routine. I don't intend to go into the theory of how it works because it involves complex maths. Enough to say that the variable *E%* is the key and is calculated to define an error value. This controls whether to change the value of X or the value of Y for the position of the next pixel.

Finally Program VI is a full machine code version of this circle drawing technique that will also produce filled circles if you want them. It takes three parameters, the two coordinates of the centre and the radius.

Each of these must be integer and preferably a multiple of four, as shown in the test routine. The fill/no fill option is selected by having the carry flag clear or set on entry to the routine. BBC Basic sets the carry flag to the least significant bit of C%.

```
 10 REM Program V
 20 MODE 4
 30 OX% = 500
 40 OY% = 500
 50 R% = 200
 60 X% = 0
 70 Y% = R%
 80 E% = 3-2*Y%
 90 REPEAT PROCnext
100 UNTIL X%>Y%:END
110 DEF PROCnext
120 PROCplot(X%,Y%)
130 PROCplot(-X%,Y%)
140 PROCplot(X%,-Y%)
150 PROCplot(-X%,-Y%)
160 IF E%<0 E%=E%+4*X%+6 ELSE E%=E%+4*
(X%-Y%)+10:Y%=Y%-4
170 X%=X%+4:ENDPROC
180 DEF PROCplot(X%,Y%)
190 PLOT 69,X%+OX%,Y%+OY%
200 PLOT 69,Y%+OX%,X%+OY%
210 ENDPROC
```

Program V

So there you have it, I won't pretend the program is simple because it isn't. There are several places where it has been optimised – for instance keeping two copies of variables one of which is multiplied by two for later use – which appears to confuse things.

Its speed is also limited by the fact that it still uses the PLOT command, rather than accessing the screen directly, but its length would have at least been doubled if direct screen access had been used.

As it stands it provides a good example of circle drawing and with a little work it can be modified into an operating system command.

Turn to Page 70 ▶

```
 100 REM Program VI
 110 REM by Steve Turnbull
 120 REM (c) The Micro User
 130 PROCinit:PROCassem
 140 MODE 2:PROCtest:END
 150 DEF PROCinit
 160 oswrch=&FFEE
 170 step =4:parms=&600
 180 ptr  =&70:OX   =&72
 190 OY   =&74:X    =&76
 200 Y    =&78:delta=&7A
 210 radis=&7C:plot2=&7E
 220 Xx2  =&80:Yx2  =&82
 230 DIM code 512:ENDPROC
 240 DEF PROCassem
 250 FOR L%=0 TO 2 STEP 2
 260 P%=code:[OPT L%
 270 .circle
 280  LDA #69
 290  BCC nofill
 300  LDA #5
 310 .nofill STA plot2
 320  LDA parms+1:STA ptr
 330  LDA parms+2:STA ptr+1
 340  LDY #0:LDA (ptr),Y:STA OX
 350  INY:LDA (ptr),Y:STA OX+1
 360  LDA parms+4:STA ptr
 370  LDA parms+5:STA ptr+1
 380  LDY #0:LDA (ptr),Y:STA OY
 390  INY:LDA (ptr),Y:STA OY+1
 400  LDA parms+7:STA ptr
 410  LDA parms+8:STA ptr+1
 420  LDY #0:LDA (ptr),Y:STA Y
 430  STA radis:STA delta
 440  INY:LDA (ptr),Y:STA Y+1
 450  STA radis+1:STA delta+1
 460  LDA #0:STA X:STA X+1
 470  STA Xx2:STA Xx2+1
 480  JSR doubleY
 490 .main_loop
 500  JSR plotXY:JSR swapXY
 510  JSR plotXY:JSR swapXY
 520 .horiz
 530  JSR incX:JSR addXD:JSR incD
 540  LDA delta+1:BMI check
 550  CMP radis+1:BCC check
 560  BNE diag
 570  LDA delta:CMP radis
 580  BCC check:BEQ check
 590 .diag
 600  JSR decY:JSR subYD:JSR incD
 610 .check
 620  LDA Y+1:CMP X+1
 630  BCC exit:BNE main_loop
 640  LDA Y:CMP X:BCS main_loop
 650 .exit RTS
 660 .incD CLC
 670  LDA delta:ADC #step:STA delta
 680  LDA delta+1:ADC #0:STA delta+1
 690  RTS
 700 .incX CLC
 710  LDA X:ADC #step:STA X
 720  LDA X+1:ADC #0:STA X+1
 730 .doubleX
 740  LDA X+1:STA Xx2+1
 750  LDA X:ASL A:STA Xx2
 760  ROL Xx2+1:RTS
 770 .decY SEC
 780  LDA Y:SBC #step:STA Y
 790  LDA Y+1:SBC #0:STA Y+1
 800 .doubleY
 810  LDA Y+1:STA Yx2+1
 820  LDA Y:ASL A:STA Yx2
 830  ROL Yx2+1:RTS
 840 .addXD CLC
 850  LDA delta:ADC Xx2:STA delta
 860  LDA delta+1:ADC Xx2+1
 870  STA delta+1:RTS
 880 .subYD SEC
 890  LDA delta:SBC Yx2:STA delta
 900  LDA delta+1:SBC Yx2+1
 910  STA delta+1:RTS
 920 .plotXY LDA #69:JSR plot
 930  JSR negX:LDA plot2:JSR plot
 940  JSR negY:LDA #69:JSR plot
 950  JSR negX:LDA plot2:JSR plot
 960  JMP negY
 970 .negX
 980  LDA X+1:EOR #&FF:STA X+1
 990  LDA X:EOR #&FF:CLC
1000  ADC #1:STA X
1010  LDA X+1:ADC #0:STA X+1:RTS
1020 .negY
1030  LDA Y+1:EOR #&FF:STA Y+1
```

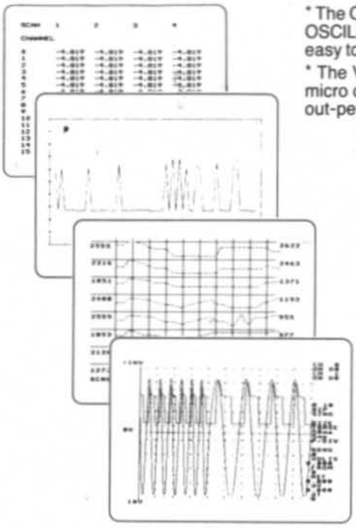
Program VI

◄ From Page 69

```
1040  LDA Y:EOR #&FF:CLC
1050  ADC #1:STA Y
1060  LDA Y+1:ADC #0:STA Y+1:RTS
1070 .plot PHA
1080  LDA #&19:JSR oswrch
1090  PLA:JSR oswrch:CLC
1100  LDA X:ADC OX:PHP
1110  JSR oswrch:PLP
1120  LDA X+1:ADC OX+1:JSR oswrch
1130  CLC:LDA Y:ADC OY:PHP
1140  JSR oswrch:PLP:LDA Y+1
1150  ADC OY+1:JMP oswrch
1160 .swapXY
1170  LDX X:LDY X+1:LDA Y
1180  STA X:LDA Y+1:STA X+1
1190  STX Y:STY Y+1:RTS
1200 ]:NEXT:ENDPROC
1210 DEF PROCtest
1220 Z%=RND(-TIME):REPEAT
1230 GCOL RND(3)-1,RND(8)-1
1240 X%=(RND(320)-1)*4
1250 Y%=(RND(256)-1)*4
1260 R%=RND(128)*4
1270 C%=RND(7)<4
1280 CALL circle,X%,Y%,R%
1290 UNTIL FALSE
1300 ENDPROC
```

Get it right!

LINE	CHSUM	LINE	CHSUM	LINE	CHSUM	LINE	CHSUM	LINE	CHSUM	LINE	CHSUM
100	= 0 0	310	= F4AD B	510	= C4C1 7	710	= 9ECC 2	910	= A5EC E	1110	= 7929 3
110	= 0 0	320	= 64D C	520	= FB61 F	720	= AB22 E	920	= 16D6 2	1120	= A388 B
120	= 0 0	330	= B75B 8	530	= B447 F	730	= 46FD 7	930	= 1FD3 D	1130	= 369 6
130	= 597F F	340	= 4C2C E	540	= 2F28 F	740	= B24C 1	940	= 22A5 F	1140	= 28EF B
140	= 9D65 A	350	= 5CD5 C	550	= E39 F	750	= 8C66 1	950	= 1FD3 7	1150	= 609F C
150	= 40D7 1	360	= 7181 4	560	= 534 D	760	= B864 C	960	= FA18 4	1160	= 16F4 B
160	= 78 6	370	= 9EE6 3	570	= 1C2B 4	770	= A1B 9	970	= 54F 1	1170	= 7F5E C
170	= E207 9	380	= 5C0D 9	580	= 8405 C	780	= 963B 8	980	= 1275 5	1180	= 57A7 8
180	= D419 2	390	= 6BE5 8	590	= 759F 2	790	= D37D D	990	= 3799 A	1190	= 3A42 0
190	= 3078 E	400	= 5CC5 3	600	= 2097 E	800	= 56DC 9	1000	= E75D F	1200	= 953B B
200	= 598A 5	410	= B566 5	610	= 6D9B 2	810	= 5D7E A	1010	= C0CE B	1210	= 7EBF 8
210	= CD1B 9	420	= 8C6E 3	620	= 5890 D	820	= 15AA 5	1020	= 156E 4	1220	= 742F 0
220	= 7B0A 1	430	= 98EB 3	630	= AB9 1	830	= 5347 4	1030	= D574 B	1230	= 1BF9 D
230	= C4E4 B	440	= 5CB0 C	640	= D86D 0	840	= 45FB 1	1040	= 34EC D	1240	= E0B9 5
240	= B623 6	450	= 2C24 8	650	= 2A36 0	850	= 181B 6	1050	= F77C F	1250	= C35B C
250	= AAB9 9	460	= A333 F	660	= CB8B B	860	= F719 0	1060	= 1577 B	1260	= 62A2 5
260	= 7CBB 3	470	= ED8C 8	670	= 7F59 5	870	= A5EC 5	1070	= 3E6D B	1270	= 9EA5 6
270	= 6344 2	480	= 1326 A	680	= E678 D	880	= B77B 1	1080	= 84CA B	1280	= 3EB3 A
280	= B89E C	490	= 9F1B B	690	= 9843 D	890	= A206 5	1090	= 69BA 6	1290	= 226C 2
290	= B51C A	500	= C4C1 D	700	= 44FA B	900	= 481A E	1100	= 2F9A F	1300	= ED0F F
300	= 5230 8										



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HARDWARE

VIS is based on a precision computer controlled 16 channel A-D converter, with six programmable ranges and read rates of 50k samples per second at 8 bit resolution, 25k at 12 bit.

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SOFTWARE

The menu-driven acquisition, analysis and display programs combine on screen set up of measurement parameters, SPREADSHEET data manipulation and a range of data display formats, including 8 trace CHART RECORDER and oscillogram.

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The OASIS VIS carries full documentation to allow the beginner or professional programmer to create new interface applications or personalised instrument emulations.

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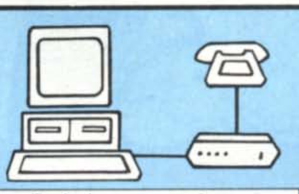
When you join MicroLink you've got the world of communications at your fingertips – 24 hours a day. You'll have immediate access to ALL the facilities offered by Telecom Gold ... and a great deal more besides.



	Typical comms packages
A	*Watford: Apollo V21, V23 auto-dial, auto-answer modem + Comms rom (£82.25)*
B	*Dataphone: Demon V21, V23 auto-dial, auto-answer modem + Z-ROM + Disc-Connect software (£96.49)*
C	*Pace: Nightingale V21, V23 manual dial modem + Commstar II rom (£98.90)*
D	*Beebug: V21, V23 auto-dial, auto-answer modem + Comms rom (£103.99)*
E	*Miracle: WS4000 V21, V23 auto-dial, auto-answer modem + Dialup (£285.39)*

All you need – apart from your BBC Micro – is a modem, which plugs into your telephone wall socket, plus suitable communications software.

We have provided a list of possible combinations below, ranging from the very cheapest to ones which can automatically dial the MicroLink telephone number and connect you to the service – all you have to do is type in your personal security password.

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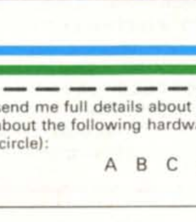

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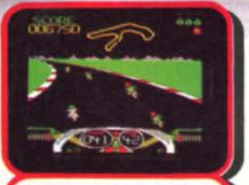
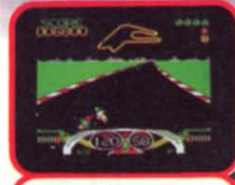
CRAZEE RIDER

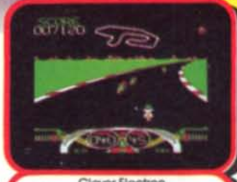
Setting the Scene



Going round the bend at Misano (BBC MICRO VERSION)



Knocking off an opposing rider (BBC MICRO VERSION)



Clever Electron programming techniques (ACORN ELECTRON VERSION)

If you can't beat them, knock them off!

Howling round the bends at Le Mans at 150 m.p.h. is a daunting experience. You'll need nerves of steel and slick reflexes to finish in the Top 6 and qualify for the next race. If, at first, you can't make the grade you can always let off steam (and gain bonus points) by bumping into the other riders and knocking them off their bikes; listen for the terrified wail as the rider is sent flying to the ground.

Each race has 60 participants — and the further you get, the tougher the competition becomes. Bonus points are awarded for a good finishing position, and your "hit-count" shown at the top of the screen records the number of other riders you have sent tumbling from their steeds.

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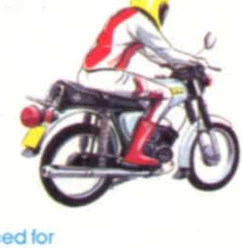
An enhanced version has been specially produced for owners of the BBC Master Series computers. Included free with all BBC Micro cassettes and discs, this version features several extra race circuits, a beautiful 6-minute musical soundtrack, and a host of extra game features — making full use of the Master's extra memory and capabilities.



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Archimedes fits DES guidelines

NEW Government guidelines on the future of information technology in schools have virtually become an endorsement of the Archimedes.

Though this advice to local authorities does state that no micro is known that could meet all its recommendations, it puts forward several requirements which can only be satisfied at present by the new wonder machine.

The first three "principles underlying recommendations" are that future hardware should provide a substantial potential for software portability, should offer a high degree of compatibility with schools' existing software and expertise, and that systems in schools should provide compatibility with commercial software systems in this and other countries.

In its guidance on purchase of systems, the report suggests: "LEAs will wish to give particular attention to the need to purchase microcomputer systems which will run as substantial a proportion as possible of their existing educational software, as well as offering the potential to run programs in internationally standardised languages". Most educational software is BBC Micro based and will run on the Archimedes.

It goes on: "At present, with only on average two micros per primary school and a corresponding figure of 14 for secondary schools, machines limited to one or two specific applications are in general not going to meet the main requirements or to show maximum return on investment.

"There will continue therefore to be a premium on machines which have built-in versatility to enable them to be capable of being used for the wide and growing range of applications across the curriculum".

All of which, along with an expandability index, points to the wide use of Archimedes in educational establishments.

This is reinforced by the report's comment: "It is not suggested that schools should necessarily buy IBM compatible computers. Indeed to do so may not be consistent with some or other recommendations".

The report follows the Government's announcement that it proposes to make Education Support Grants (ESG) available towards information technology ,in schools.

The central aim of the strategy is to harness the potential of IT for enhancing the quality of teaching and learning across the curriculum and to extend that benefit as widely as possible.

In addition to the salaries of advisory teachers, the proposed ESGD will make available some £8.5 million in 1988/89 for buying micros, in order to improve computer-pupil ratios.

"The Government is anxious to maintain the coherence in hardware and software standards. Authorities will be asked to show how they have taken account of the recommendations in arriving at a decision on the hardware they are proposing to purchase", the report points out.

DIALUP
EDUCATIONAL
COMMUNICATIONS
SOFTWARE
USER MANUAL

Comms pack price drops

THE communications software package, Dialup Education, has been reduced in price by £30 to £59.95.

Designed by PMS Communications (021-643 7688) for the education market, the package has a special TTNS emulation which is needed to access the Times Network for Schools, plus viewdata and TTY emulation.

PMS say that the package is capable of accessing the majority of educational services and databases including Prestel education, Neris, Epnidesk, TTNS, MicroLink and Telecom Gold.

EDUCATION NEWS

Sax Appeal – St. Joseph's pupils with synthesiser and BBC Micro

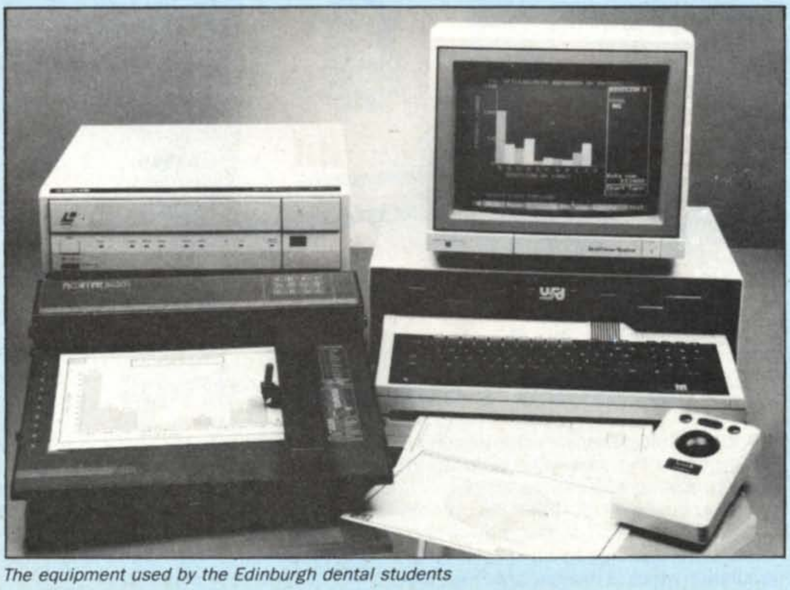
Getting their teeth into it

THE BBC Micro and Wordwise Plus are being used by dental students at the University of Edinburgh to help chart their patient's teeth.

Students are using the system where reports include a chart of the patient's teeth stating which were present on examination, which were missing or unerupted and where gaps due to missing teeth had become closed.

Extensive use has been made of the segments and programming ability of Wordwise Plus to provide on screen prompts to which the student responds.

Once the information has been entered a printout can be produced or the details merged with text to produce a final report.


The equipment used by the Edinburgh dental students

Synthesisers in class

PUPILS at St Joseph's College in Stoke on Trent are using a BBC Micro and synthesisers alongside conventional instruments in their music lessons.

Seven inch vinyl pop discs that they are used to buying in order to get their favourite groups into the charts have given way to the 5.25in floppy disc for music of a completely different kind.

The computer is proving even more popular with the students than the triangle and drum kit because of the variety of sounds that it can produce. One project has been to program the computer to play a note perfect, harpsichord style Bach minuet backing track which was then added to a live saxaphone performance to provide the music for a school concert.

The GCSE music students regularly use computers, multi track tapes and synthesisers as part of their course work. Music teacher Martin Walley said: "Using the computer to play music is helping to generate a lot of enthusiasm from the students".

Library database

SCHOOLS that are having problems with trying to computerise their library may just benefit from a new program by John O'Brien of Manchester.

The program appeared following a letter in the September issue of *The Micro User* from Alan Turner who requested details of a database that would be suitable for a school library. His requirements were for a program that would run on a BBC Micro and was capable of storing details of 15,000 books and 1,400 pupils.

Mr O'Brien's Micro Librarian program runs on a BBC Master 128 with twin 80 track drives and can store details of 12,000 books and details of up to 2000 pupils. The data fields are title, author, Dewey/ISBN, number of times the book has been borrowed, the name of the borrower and the date.

A form list can be printed out which would show teachers of each class which of their pupils has a book that is overdrawn. The program also contains a search and browse facility. One other

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Grand Prix Construction Set	Cass £9.00	Disc £10.50
Colossus Chess	Cass £9.00	Disc £13.50
Crystal Castles	Cass £9.00	Disc £13.50
Imogen	Cass £8.50	Disc £ 9.50
Cholo		Disc £16.50
Don Junz	Cass £2.99	Disc £7.95
Paper Boy	Cass £9.50	Disc £14.50
Round Heads	Disc Only	£12.95
Phantom	Cass £7.50	Disc £12.00
Repton Around the World	Cass £6.50	Disc £7.50
Codename Droid	Cass £9.00	Disc £10.50
Crazee Rider	Cass £9.00	Disc £11.50
Arkanoid	Cass £9.00	Disc £11.50
Smileys People	£9.00	£13.50
Graham Gooch Test Cricket	£9.00	£11.00
Palace of Magic	£9.00	£11.00
Five Star Games II	£9.00	
Geoff Capes Strong Man	£2.50	
Hercules	£2.50	

AMX Mouse Products

(Please state – B, B+, Master 128, Compact)

New Mouse III with Superart	£75.00
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Superart only	£45.00
Max	£18.00
Pagemaker	£45.00
Extra Extra	£22.00
Design Cad	£63.00
3D Zicon	£22.00
Xam	£22.00
Mind Games	£13.50
Paint Pot	£13.50
Desk	£22.00
Mouse Mat	£5.00

Monitors

Philips BM7502 Green High Res	£79.00
Philips BM7522 Amber High Res	£85.00
Philips BM 7542 White High Res	£85.00
Philips swivel stand for above	£9.00
Philips CM8833 RGB + Mono + Sound **(NEW)**	£280.00
Microvitec 1431 Colour std res	£225.00
Microvitec1451 Colour med res	£270.00

CTV/MONITORS

Ferguson MC05 14" CTV +RGB	£195.00
Monitor to Master/BBC/Compact lead to suit	£4.50
Sanyo 14" CTV + AGB	190.00

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PINEAPPLE SOFTWARE

Programs for the BBC model B, B+, Master and Master Compact with disc drive

DIAGRAM II

Diagram II represents a major breakthrough in the techniques used for drawing software on the BBC micro. It works on a completely different principle to other drawing software by storing the drawing information straight to disc as coded 8*8 pixel blocks.

This technique has three major advantages. First, the size of the diagram is only limited by the amount of space on disc. Second, there is no limit to the amount of information which can be stored on a given diagram as the information is stored on disc and not in computer memory. Third, the disc storage technique allows the smooth scrolling of the screen over the whole surface of the diagram.

For people not familiar with Diagram, the basic operation of the program is to first display any part of the diagram, either by quoting an index name or screen number. At this point you are free to scroll the diagram around the screen using either cursor keys, trackerball or mouse. You may stop scrolling at any point and enter the edit mode which allows you to modify or add new information to the diagram. When you have finished making alterations, the new information is stored to disc and you are free to scroll elsewhere on the diagram stopping to edit at any time.

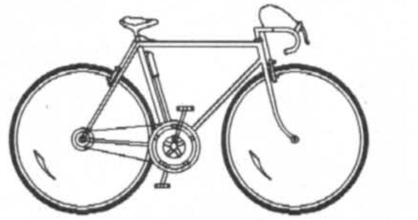
The edit features are now very comprehensive. Text may be typed straight from the keyboard, and if other fonts are stored as user defined characters then these fonts may be printed using the normal keyboard keys.

The print routines are now completely 'scaleable' with both the horizontal and vertical scales being totally variable in 1% steps between a size that will give 18 mode 0 screens on an A4 sheet and a size that would print just one pixel on a sheet! The routines are adaptable to most types of dot matrix printer and full advantage may be made of wide carriage printers. The printouts may be rotated through 90 deg. if required.

The new editing features make DIAGRAM II suitable for all types of serious drawing application including scale drawings, flow charts, architectural, family trees, and many other subjects as well as circuit and schematic diagrams. As an example of what Diagram II can do, this complete advertisement (with the exception of the PCB drawing) has been produced with the package.

SUMMARY of DIAGRAM II FEATURES

1. Works on any model BBC computer with either DFS or ADFS.(ADFS only if Shadow memory available).
2. Will automatically take advantage of shadow memory (any make) to provide more User Definable Characters, 880 with Shadow, 381 without Shadow.
3. Rapid horizontal and vertical line drawing routine with automatic joins for circuit diagrams.
4. Full rubber band line drawing and circle drawing modes.
5. Takes advantage of the Acorn GXR rom to provide drawing of arcs, sectors, chords, parallelograms, ellipses, and flood filling. Note this rom is already fitted to Master and Compact machines.
6. Pixel cursor drawing and deleting mode allows very fine detail to be added.
7. Defined areas of screen may be moved, copied, deleted or saved to disc.
8. On-screen indication of cursor position shows either the cursor position on the overall diagram or the distance from a preset point.
9. Keyboard keys may be predefined to print User Defined Characters, enabling new character sets to be stored as user defined characters and then printed straight to the screen using the keyboard keys.
10. Wordprocessor files may be loaded to the screen and automatically formatted into any shape screen area.
11. Index names may be set up to point to given areas of a large diagram, to enable rapid access to a given point on a diagram.
12. Fully compatible with Marconi trackerball and most makes of mouse.
13. All Diagram 'Utilities' are included, enabling screen ident numbers and borders to be added, and any area of diagram to be moved or copied. The whole diagram may be displayed in reduced scale (either 4*4 or 8*8 format) on a single screen, and the size of the overall diagram may be increased or decreased.
14. Completely scaleable print routines allow any area of the diagram to be printed either horizontally or through 90 deg. in scales that may be varied in 1% steps allowing up to 18 mode 0 screens to be printed on an A4 sheet (still with readable text).
15. Complete with 40 page easy to understand handbook.



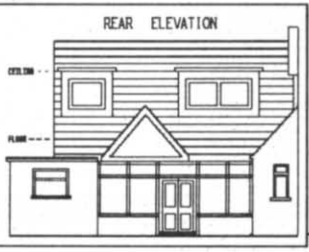


Diagram II consists of a set of disc files and a 16k Eprom. The disc supplied is formatted in 40T on side 0 and 80T on side 2. Please state if this is unsuitable for your system, or if you require a 3.5" Master Compact disc.

DIAGRAM II — £ 55.00 + vat

P & P free (except overseas)

N.B. Upgrades are available to existing Diagram owners. Please contact Pineapple if you have not received an upgrade letter.

PCB

Pineapple's now famous printed circuit board draughting aid produces complex double sided PCB's very rapidly using any model BBC micro and any FX compatible dot-matrix printer.

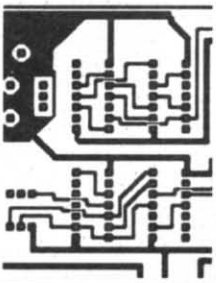
The program is supplied on Eprom and up to 500 component and 500 ASCII component descriptions may be stored for each PCB. There is no limit to the number of tracks that may be stored for a given PCB although the maximum board size is restricted to 8" * 5.6".

Using a mode 1 screen, tracks on the top side of the board are shown in red, while those on the underside are blue. Each side of the board may be shown individually or superimposed. A component placement screen allows component outlines to be drawn for silk screen purposes and component numbers and outlines entered on this screen may be displayed during track routing to aid identification of roundels.

The print routines allow separate printouts of each side of the PCB in a very accurate expanded definition 1:1 or 2:1 scale enabling direct contact printing to be used on resist covered copper clad board. The print routines are very fast taking typically 5 minutes for a 1:1 print of a 7" * 5" board.

This program has too many superb features to describe adequately here, so please write or 'phone for more information and sample printouts.

PRICE £ 85.00 + vat



PCB PLOTTER DRIVER

A new addition to the PCB software is the PCB plotter driver program. This enables files produced by PCB to be used in conjunction with most types of plotter to produce plotted output rather than the normal dot-matrix printer output.

In this way plots may be produced directly onto film or even directly onto copper board with an etch resistant pen if a suitable plotter is available. The program is suitable for use with most makes of plotter including Hewlett Packard, Hitachi and Plotmate M. The program can also be configured to work with other plotters by entering suitable plotter instructions.

All the features of the printer driver are included, such as the automatic thinning down of tracks between roundels. Mirror image plots are also available.

PRICE £ 35.00 + vat

MARCONI TRACKERBALL

This high quality device comes in three versions. Version one is for the standard BBC micro and comes with the Icon Artmaster drawing package from Micro-Draw, and Trackerball Utilities which allow the trackerball to be used with other software.

Version two is for the Master 128 computer and this comes with the Pointer Rom. This is a Rom which allows the Master to be configured for use with the Trackerball and has commands to enable the Trackerball to intercept the cursor key or joystick routines of other software. Commands are also available to reverse the axes of the trackerball and set the sensitivity. The three buttons may also be set up to produce any ASCII code.

Version three is simply the bare Trackerball which comes without software but is suitable for use with specially written software such as Diagram or Diagram II.

Trackerball adapters are also available which plug onto the end of the cable and convert the connections of the trackerball to be the same as a mouse. This enables the trackerball to drive all types of 'mouse' software.

For Model 'B' and B+ (with Icon Artmaster)	**£ 60.00 + vat**
For Master 128 (with Pointer Rom)	**£ 60.00 + vat**
Bare Trackerball (no software)	**£ 49.00 + vat**
Pointer Rom - available separately	**£ 12.50 + vat**
Trackerball to mouse adapters	**£ 8.00 + vat**
Postage & packing on Trackerballs	**£ 1.75**

MITEYSPICE

Miteyspice is a very powerful AC & DC circuit analysis package with graphics suitable for use with any model BBC micro including those with 2nd processors.

As well as all the usual facilities available with this type of program, non-linear effects, small signal, noise measurements and sweeps may be performed. Component values may be swept, allowing component tolerances to be investigated as well as thermal performance etc. Comprehensive transistor modelling is incorporated using a 20 parameter Ebers Moll description. The program is supplied on disc with a very comprehensive 49 page manual.

PRICE £ 119.00 + vat

ADFS Utilities Rom — ADU

ADU is an invaluable utility for all ADFS users. It adds over 20 new *commands to the ADFS filing system as well as providing an extensive Menu facility with over 35 sub commands covering areas such as repeated disc compaction, saving and loading Rom images, auto booting of files and many more.

Copying of DFS discs onto ADFS discs can be made in one pass with automatic creation of the required directories on the ADFS disc. All functions are fully compatible with Winchester drives including *BACKUP which allows backing up of Winchesters onto multiple floppies.

Additional *commands include:- *ADU, *BACKUP, *CATALL, *CHANGE, *DFSDFS, *DIRALL, *DIRCOPY, *DIRDESTROY, *DIRRENAME, *DISCEDIT, *DRIVE, *FILEFIND, *FORMAT, *KILLADU, *LOCK, *MENU, *PURGE, *PWRBRK, *UNLOCK, *VERIFY, *VFORMAT.

PRICE £ 29.00 + vat

All orders sent by return

VISA

39 Brownlea Gardens, Seven Kings, Ilford, Essex IG3 9NL Tel 01-599 1476

Access

feature of the program is an automatic return date function which takes into account any school holidays. The return period is stored in the software but can be manually adjusted.

The package is currently being tested by Mrs Lynne Jackson who is the librarian at Hyde High School, Tameside in Manchester. Once tests are completed the software will go on general release.

Programme notes on air

THE BBC Education services department is extending its service to teachers by providing programme notes on Ceefax.

After an experimental period of just over a year the BBC has concluded that to provide teachers notes on telesoftware which can be downloaded is a far more efficient way of distributing information to schools and colleges.

Normally programme notes have to be requested by teachers in advance of a broadcast; with the help of Ceefax the ordering process can be dispensed with.

The service has several advantages, notes can be prepared by the BBC up to a week before the broadcast, any updates can be down-loaded instantly and expensive reprinting costs of updated material has been done away with.

Further details of the service can be obtained from the BBC's Education Department on 01-991 8015.

Plotting with Domesday

EDUCATIONAL establishments which are using the BBC Enterprises Domesday project now have a new way of presenting the stored data other than on screen.

Linear Graphics (0702 541663) has released a utility disc for its plotters that makes use of the software on the Domesday welcome disc. Data on the national disc can then be re-processed into pie, bar and line chart format as required.

Schools that have access to a Domesday system at a remote location can spool data to a separate disc of their own and upon return to the classroom use Plotmate to output the data. Price of the utility disc is £25. Plotters are available from £375.

Micro aids the disabled

SEVERELY disabled students at Clatterbridge school in Bebington, Merseyside are benefiting from the use of the BBC Micro in the classroom.

Two students in particular, Claire Pinches and Kathryn Weir have been able to express themselves more freely thanks to BBC Micros. Claire, aged 12, was featured recently in the BBC Television programme "With a little help from the chip".

Because she is unable to use the BBC Micro keyboard or even a joystick a photonic wand was developed whch clips to Claire's glasses. Simply by moving her head and pointing a beam of light at a receptor the appropriate letter is then registered on the screen.

"The benefits to her have been tremendous", says deputy headmaster Gareth Green. "Thanks to the BBC Micro and the photonic wand she has been able to progress much faster than would otherwise have been possible".

Dr John Cole developed the photonic wand especially for Claire following a chance conversation over dinner. The wand and the software for the BBC Micro were completed in a single weekend and proved so successful that it is now used widely.

Thanks to the wand, Claire is able to complete all of her school work on the computer using the Write word processor which was also written by Dr John Cole.

Kathryn, aged 10, has also been helped by the BBC Micro. She is confined to a wheelchair and although has very little strength in her arms she is able to move about using a joystick to control her wheelchair.

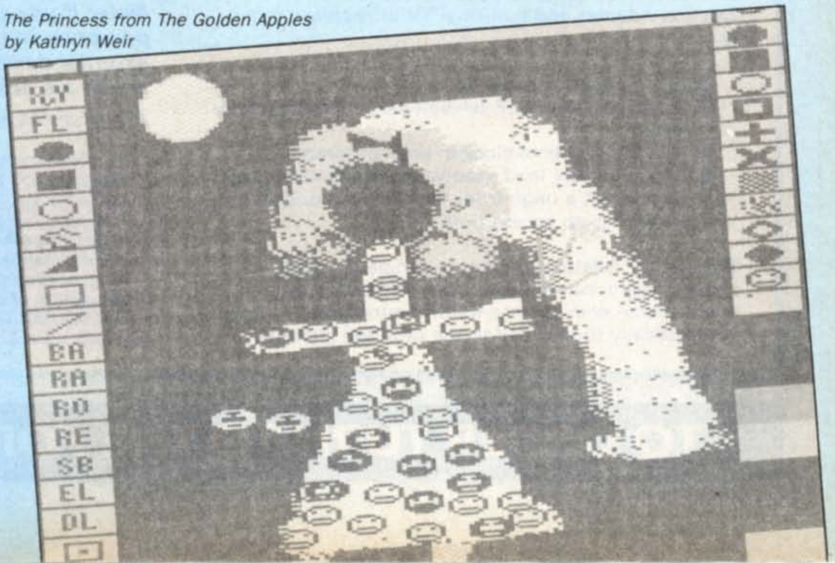
"Although Kathryn has very little physical strength she has a very delicate artistic touch which she uses to her advantage", said Gareth.

Because she is so weak a joystick with extra sensitive micro switches was developed. The joystick linked to the BBC Micro with the Painter program loaded allows Kathryn to draw on screen. "Considering she is only 10 years old and so severely handicapped the drawings she produces are excellent", said Gareth.

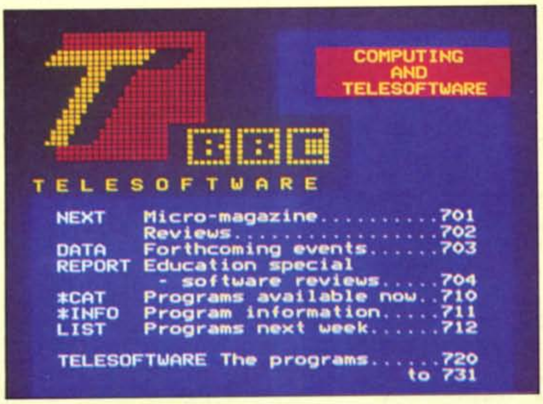
Claire Pinches

Kathryn Weir

The Princess from The Golden Apples by Kathryn Weir



Turn your BBC Micro into a teletext receiver!



```
                    COMPUTING
                       AND
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Join the 3.5 million households who regularly use teletext. The thousands of pages on Ceefax, Oracle and 4-Tel cover everything from programme details and up-to-the-minute news to share prices and football results.

But if you have a BBC Micro you can do much more than flash from page to page. With the Morley Teletext Adapter and a normal TV or monitor, you can:

- Store pages in memory
- Download the FREE telesoftware (updated every week)
- Use the real-time clock in your programs
- Automatically load associated pages each time you select a page from the menu – considerably speeding up access time

The Morley Teletext Adapter is simple to install – it plugs straight into the user port. The software is menu-driven with easy-to-follow instructions – it even automatically tunes itself to the required channel.

MORLEY ELECTRONICS
TELETEXT ADAPTER SUPPORT ROM
Advanced Teletext System
USER GUIDE
MORLEY ELECTRONICS
Morley Electronics
TELETEXT ADAPTER

What you get

The stylish teletext unit, 16k ATS rom, 16k utilities rom (including printer dumps), two manuals and a utilities disc. An optional power supply is available.

NORMAL PRICE £127

SPECIAL OFFER PRICE £99.95

Note: If you use your BBC Micro's auxilliary power socket for your disc drive, or any other external device, you will need a power supply which we can provide for £9.95.

All prices include VAT and P&P.

***IMPORTANT:** The BBC points out that a teletext adapter, like a TV set, will not work satisfactorily without a good outside aerial. Nor will it function correctly if you experience reception problems such as ghosting.*

They emphasise that these problems only affect a few areas of the country. However if you have any doubts as to the quality of signal available in your area you should contact the BBC Technical Support Service on 01-927 5040.

TO ORDER TURN TO THE FORM ON PAGE 149

Teachers' guide

Jeremy Brayshaw

shows how to get free notes from Ceefax

NOTES to accompany BBC radio and television educational programmes are now available without having to fill out complex order forms, or part with any money.

BBC Telesoftware are broadcasting the notes to over 30 series and they are available free to anyone with a micro and suitable teletext adapter (a teletext TV set cannot be used).

Once received, the notes can be easily printed out if you have a printer. A word processor is not needed, but can be used to reorganise the text to form pupil worksheets or a written summary of the programme.

If your BBC Micro and teletext adapter are equipped with the ATS rom, then this program will help you. It will scan the BBC transmissions to find out what software is currently being broadcast. If teachers' notes are available they will be automatically downloaded, recompiled into a plain text file and saved to disc.

To use the software, make sure your adapter is switched on and connected to both an aerial and the computer. Load the program, then insert a blank disc ready to receive the notes. Type RUN, then sit back.

The micro will diligently work away until all the notes have been saved on disc. Once saved, the notes can be read by selecting an 80-column mode such as Mode 3, and entering:

***TYPE <filename>**

Before pressing Return press either Control+N to stop the screen scrolling – giving you time to read the text – or Control+B to send the text to your printer as well as the screen. After printing the notes, press Control+C, otherwise your printer will obediently reproduce everything you type thereafter.

The notes sent by Telesoftware have been formatted to suit standard continuous printer paper (66 lines per page, 80 columns per row) so no alterations are be needed to reproduce the notes on any popular computer printer.

For any other size paper, it may be necessary to adjust the text to suit, using any wordprocessor. To load the text into Mini Office II or Wordwise, use the normal Load Text option.

With View, type READ <filename> (instead of the more usual LOAD command) and for other word processors, follow that system's User Guide for details of loading plain Ascii files.

Teachers' notes from Telesoftware save time, money and effort. Using ATS to receive them makes the downloading process very simple.

With our automatic downloader program as well, the whole process becomes so easy you'll wonder why you ever got the notes in any other way.

```
  100REM  **************************
  110REM  * AuNotes - ATS Utility *
  120REM  **************************
  130ONERRORGOTO410
  140MODE7
  150VDU23;8202;0;0;0;
  160*TTXON
  170*BBC2
  180*HON
  190PROCmove_oshwm
  200DIM space 20,name 12,line 15
  210DIMpage%(30),fname$(30),load%(30),e
xec%(30),pages$(30),mag%(30),D(5)
  220PROCheading("File: Catalogue")
  230A%=TIME:REPEAT:UNTILTIME>A%+200
  240PROCfindcat(FNgetlink)
  250IFM%>9 ORN%>&FE PROCheading(" Error
 - No Catalogue"):GOTO410
  260PROCheading("File: Catalogue     Pa
ge: "+STR$(M%)+RIGHT$("00"+STR$~(N%),2))
  270PRINTTAB(0,0);"P";STR$(M%);RIGHT$("
00"+STR$~(N%),2)
  280PROCdownload(M%,N%,"CATALOG",0,0,FA
LSE,TRUE)
  290PROCinterpret
  300IFZ%=0 MODE7:PROCheading(" No notes
 broadcast this week"):GOTO410
  310FORW%=1TOZ%
  320MODE7:VDU23;8202;0;0;0;
  330PROCheading("File: "+fname$(W%)+STR
ING$((12-LEN(fname$(W%)))," ")+"_Length:
 "+pages$(W%))
  340PRINTTAB(0,0);"P";mag%(W%);RIGHT$("
00"+STR$~(page%(W%)),2)
  350PROCdownload(mag%(W%),page%(W%),fna
me$(W%),load%(W%),exec%(W%),TRUE,TRUE)
  360REM PROCdownload(mag%,page%,fname$,
load%,exec%,file%,reset%)
  370NEXT
  380MODE7
  390PROCheading(" Notes downloaded:")
  400FORA%=1TOZ%:PRINT"    "+fname$(A%):
NEXT
  410*HOFF
  420PROCreturn_oshwm
  430END
  440:
  450DEFPROCmove_oshwm
  460S%=&5000
  470A%=&B4:X%=S%DIV256:Y%=0:CALL&FFF4
  480ENDPROC
  490:
  500DEFPROCdownload(magazine%,page%,fil
ename$,load%,exec%,save%,reset%)
  510PROCoscli("MAGAZINE "+STR$(magazine
%))
  520space?0=24
  530space?1=name MOD256:space?2=name DI
V256
  540$name=filename$
  550space!3=load%
  560space!7=exec%
  570space?11=magazine%
  580space?12=page%
  590IFsave%=TRUE space?13=1 ELSE space?
13=0
  600IFreset%=TRUE space?14=0 ELSE space
?14=1
  610A%=&7A:X%=space MOD256:Y%=space DIV
256
  620CALL&FFF1
  630ENDPROC
  640:
  650DEFPROCoscli(text$)
  660$line=text$:X%=line MOD256:Y%=line
DIV256
  670CALL&FFF7
  680ENDPROC
  690:
  700DEFPROCheading(fname$)
  710CLS
  720PRINT'CHR$132;CHR$157;CHR$141;CHR$1
30;"Teachers Notes from Telesoftware"
  730PRINTCHR$132;CHR$157;CHR$141;CHR$13
0;"Teachers Notes from Telesoftware"
  740PRINTTAB(1,5)fname$
  750ENDPROC
  760:
  770DEFPROCreturn_oshwm
  780A%=&B4:X%=PAGE DIV256:Y%=0:CALL&FFF
4
  790ENDPROC
  800:
  810DEFPROCinterpret
  820sta%=S%:Z%=0
  830sta%=sta%+1+?sta%:sta%=sta%+1+?sta%
  840Z=0:REPEAT
  850REM  m/c:
  860len%=?sta%
  870FORA%=sta%TOsta%+len%:?A%=(?A%)AND&
 7F:NEXT
  880T%=?(sta%+len%+1):?(sta%+len%+1)=13
 :sta$=$(sta%+1):?(sta%+len%+1)=T%
  890sta%=sta%+1+?sta%
  900IFsta$="***" GOTO1090
  910REM  filename:
  920len%=?sta%
  930FORA%=sta%TOsta%+len%:?A%=(?A%)AND&
7F
  940IF?A%>&40 ?A%=(?A%)AND&DF
  950NEXT
  960T%=?(sta%+len%+1):?(sta%+len%+1)=13
:sta$=$(sta%+2):?(sta%+len%+1)=T%
  970sta%=sta%+1+?sta%
  980REM  File type:
  990len%=?sta%
 1000FORA%=sta%TOsta%+len%:?A%=((?A%)AND
&7F)AND&DF:NEXT
 1010T%=?(sta%+len%+1):?(sta%+len%+1)=13
:sta2$=$(sta%+1):?(sta%+len%+1)=T%
 1020sta%=sta%+1+?sta%
 1030len%=?sta%
 1040FORA%=sta%TOsta%+len%:?A%=(?A%)AND&
7F:NEXT
 1050T%=?(sta%+len%+1):?(sta%+len%+1)=13
:sta3$=$(sta%+1):?(sta%+len%+1)=T%
 1060sta%=sta%+1+?sta%
```

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```
 1070IFsta2$="NOTES" Z%=Z%+1:fname$(Z%)=
sta$:pages$(Z%)=sta3$:load%(Z%)=FNaddr(s
ta%):exec%(Z%)=FNaddr(sta%+4):mag%(Z%)=?
(sta%+8):page%(Z%)=?(sta%+9)
 1080sta%=sta%+10
 1090UNTILsta$="***"
 1100ENDPROC
 1110:
 1120DEFFNaddr(st%)
 1130G$=RIGHT$("00"+STR$~(?st%),2)+RIGHT
$("00"+STR$~(?(st%+1)),2)+RIGHT$("00"+ST
R$~(?(st%+2)),2)+RIGHT$("00"+STR$~(?(st%
+3)),2)
 1140=EVAL("&"+G$)
 1150DEFFNgetlink
 1160space?0=15:A%=&7A:X%=space MOD256:Y
%=space DIV256:CALL&FFF1
 1170IF((space?1)*100)+space?2>999 PROCh
eading(" Error - No Catalogue"):GOTO410
 1180=((space?1)*100)+space?2
 1190:
 1200DEFPROCfindcat(O%)
 1210PROCoscli("PAGE "+STR$(O%))
 1220LOCALa%,pn$,row%
 1230*DATA 5000
 1240a%=&5000-42
 1250REPEAT
 1260a%=a%+42
 1270UNTIL(a%?1=27 AND FNdeham(a%?2)=0)
ORa%>&5800
 1280IFa%>&5800 M%=0:PROCheading(" Error
 -no catalogue"):GOTO410
 1290FORV%=0TO5
 1300D(V%)=27+V%
 1310D(V%)=FNdeham(a%?D(V%))
 1320NEXT
 1330M%=(((D(5) AND12)DIV2)OR(D(3) DIV8)
)EOR(O%DIV100)
 1340N%=(D(1)*16)+(D(0))
 1350ENDPROC
 1360:
 1370DEFFNdeham(byte%)
 1380space?0=25:space?1=byte%:A%=&7A:X%=
space MOD256:Y%=space DIV256:CALL&FFF1
 1390=(space?2)AND&F
```

Get it right!

```
130 = FCF6 6
140 = 8AFC 9
150 = F716 4
160 = D363 0
170 = F0AD 8
180 = 5F11 2
190 = C5B8 D
200 = 4D26 5
210 = 538E 3
220 = B1D8 F
230 = 89D0 C
240 = BFEB 9
250 = CF38 8
260 = 332B 0
270 = 57BB 2
280 =  7F0 8
290 = F205 4
300 = 8E5B 5
310 = 88B2 A
320 = 8B0B 6
330 = A662 E
340 = 4331 A
350 = 27A9 C
360 =    0 C
370 = 2C83 9
380 = 8AFC 7
390 = D83D D
400 = 38FC A
410 = 1BB1 1
420 = A51E 3
430 = FD2E D
440 = 9719 4
450 = 9000 D
460 = D671 D
470 = F9C1 1
480 = ED0F 4
490 = 9719 1
500 = 6E01 2
510 =  36C 1
520 = AF55 5
530 = D3D4 A
540 = BD8C 8
550 = B50C 6
560 = D36B 7
570 = 2F9F 0
580 = AA74 9
590 = DE05 7
600 = 3C2B 4
610 = 614C 6
620 = 8B74 2
630 = ED0F D
640 = 9719 9
650 = B13E D
660 = 1331 6
670 = EBB2 6
680 = ED0F 6
690 = 9719 E
700 = 1442 E
710 = 7A16 5
720 = 659E D
730 = BC60 7
740 = 5F71 C
750 = ED0F 1
760 = 9719 7
770 = 7287 2
780 = B659 9
790 = ED0F F
800 = 9719 E
810 = 41C7 7
820 = B440 F
830 = 9D64 8
840 = D6B2 A
850 =    0 A
860 = BE1D D
870 = 532A 6
880 = E021 4
890 = ADD4 D
900 = 6CDD F
910 =    0 F
920 = BE1D F
930 =  766 E
940 = ACBD A
950 = 2C83 D
 960 = BEF4 C
 970 = ADD4 1
 980 =    0 1
 990 = BE1D 1
1000 = 8977 9
1010 = 41D2 0
1020 = ADD4 3
1030 = BE1D 5
1040 = 532A F
1050 = 48CD 3
1060 = ADD4 7
1070 = 85FC B
1080 = DEB8 8
1090 = FB8E B
1100 = ED0F 2
1110 = 9719 E
1120 = 75BD 7
1130 = A633 4
1140 = 6C92 1
1150 = A017 1
1160 = 2461 B
1170 = FF78 2
1180 = 4402 5
1190 = 9719 F
1200 = C887 9
1210 = 1934 4
1220 = A792 F
1230 = B563 C
1240 = A87F B
1250 = BFBA 0
1260 = 2D04 C
1270 = C043 4
1280 = 1CB8 4
1290 = 376F 6
1300 = B418 4
1310 = 248F C
1320 = 2C83 A
1330 = 1350 1
1340 = 33A4 C
1350 = ED0F 0
1360 = 9719 8
1370 = 7251 B
1380 = EC4D 3
1390 = 5C1C 7
```

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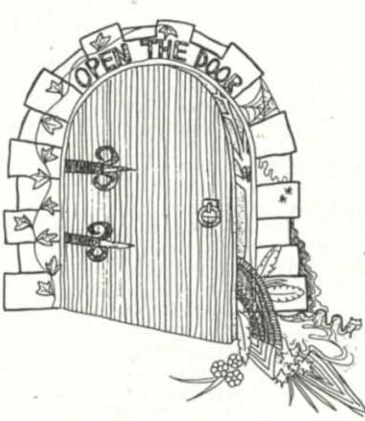

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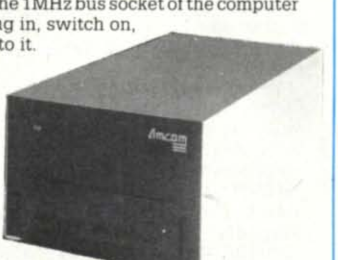

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By Peter Cockerell

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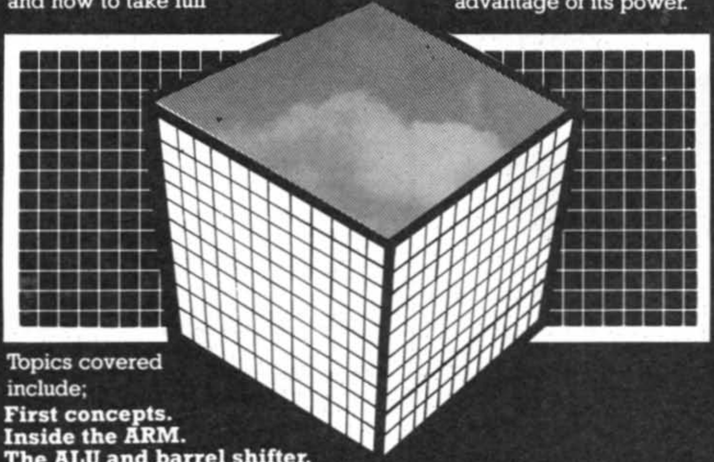

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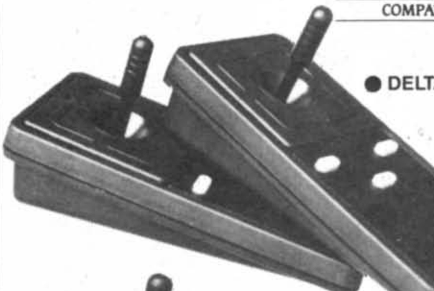

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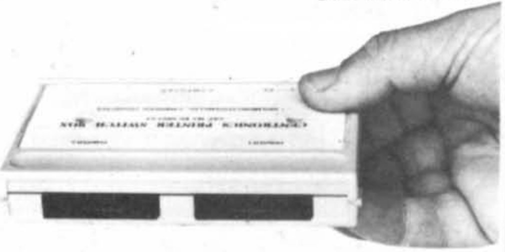

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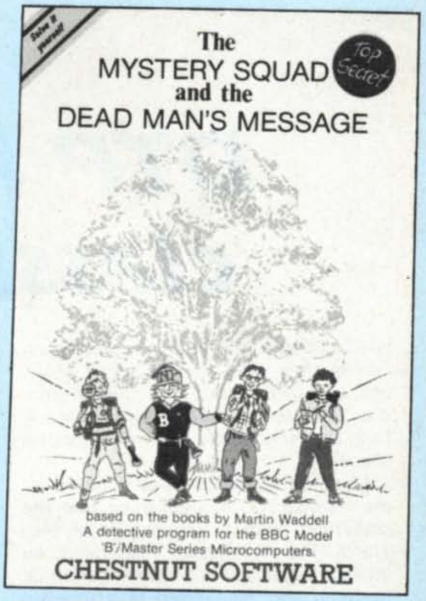
Not too elementary, my dear Watson


Solve it yourself
The
MYSTERY SQUAD
and the
DEAD MAN'S MESSAGE
Top Secret
based on the books by Martin Waddell
A detective program for the BBC Model 'B'/Master Series Microcomputers.
CHESTNUT SOFTWARE

ONE problem with attempting to review an educational program of this type is knowing exactly for whom it is best designed. To make matters worse, a succinct description of the program is almost impossible.

Based on the first of Blackie's solve it yourself mysteries, Mystery Squad Adventure One provides a scrolling text storyline on the bottom quarter of the screen, while the upper three quarters contain an illustration which is the same for each chapter.

At the end of each section of text, a multiple-choice question is asked of the "What should they do next?" variety. A helpful, and different, picture from the one shown when the text is scrolling, provides a strong clue each time.

Depending on the answer chosen from the two or three possibilities given, points are awarded towards a Detective Rating. Lowest grade is Beginner; and the child can progress through Trainee, Junior Detective and so on, right up to Sherlock Holmes.

According to the accompanying literature, the program is designed to develop skills of observation, comprehension and decision making, and (if used in a group) those of discussion and expression.

The suggested age range of pupils is 9-14 year olds – so once again, I sent the disc to my local primary school for evaluation and comment from a group of bright nine year olds and their class teacher who is the school computer specialist.

The children were very enthusiastic, and they particularly enjoyed the fact that if a totally wrong answer to the first question is entered, then a custard pie is thrown at you – the accompanying illustration shows a most suitable "splat" effect.

Their teacher was more reserved in his judgement – and I think rightly.

He particularly made the point that fairly hefty chunks of material had to be absorbed before the questions were put and criticised the unchanging text illustration.

For some brighter children working in groups the program would be fun and useful – for others it would demand constant attention from the teacher.

I must emphasise that this program was tried out on the lowest of the designated age range, and that an altogether different reaction might be obtained from those in the first two years of secondary education.

There is one other use to which this program might be put – and that, paradoxically, is in a remedial situation.

Let me explain: With a nine year old son who has some difficulty in reading, but otherwise is quite bright – it is a major battle getting him to read something.

We sat at the computer together, and I set the program running. As the text began to appear on the screen, he howled in protest that it was coming too fast. Inevitably he asked me to read it to him. Being a brutal parent I did nothing of the kind – instead I pressed the cursor down key for as long as possible.

Eventually the text appeared at a rate that he could manage, and he soon began to read aloud to me, rapidly becoming absorbed in the story. At the end of the chapter we discussed what to do and, since he made the right choice, he was thrilled to be awarded his first points.

As the story progressed, I surreptitiously increased the pace at which the text appeared little by little until, towards the end of the adventure, the text was being printed on screen at about the speed to which he had objected greatly when we first started.

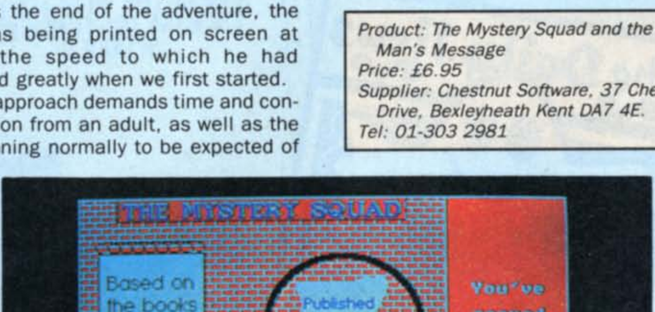
This approach demands time and concentration from an adult, as well as the low cunning normally to be expected of any teacher or parent.

It does mean, therefore, that the program could only be used in this way where the class situation meant there was someone able to be detached from other duties in order to improve a pupil's reading speed.

For those readers of *The Micro User* who are parents in a similar situation to mine, this program can certainly be recommended if they are willing to spare the time. For school use I would recommend it for the brighter pupils in a primary environment, and those of around 11 upwards.

Bob Redrup

Product: The Mystery Squad and the Dead Man's Message
Price: £6.95
Supplier: Chestnut Software, 37 Chestnut Drive, Bexleyheath Kent DA7 4E.
Tel: 01-303 2981



"They forced open the door, got in here and wrecked the place."
James was inspecting one of the shattered slot machines.

DTP in the classroom

WHEN people talk about desktop publishing they don't usually mean desks with a hinged lid and a groove for pencils. But the print revolution is now hitting the schoolroom as well as the office.

Sherston Software have approached the introduction of publishing into the classroom with a linked pair of programs. The Fleet Street Phantom is an adventure game with a newspaper office scenario and Typesetter! is a desktop publishing package for schools.

The packages can be used separately but Sherston have seen this as a wider introduction to publishing. Both packages include a wealth of ideas for further work in language, maths, science and every other area of school activities – even music.

The Fleet Street Phantom adventure is in two parts and recommends that children complete the first part in one session while the second part can be spread over several.

Neither is too long: Part one takes about 30 minutes and part two 40-50 minutes. The skill level is adjustable and I found the lower level well within eight to nine year old capability.

The graphics are very good – detailed, well-drawn scenes in good colour and clear text make this a very attractive package. There are a few humorous details and the denouement had my junior testers laughing at the animation.

The tasks which have to be completed in order to identify the phantom (he has a similar affect to a printer's devil) are language-based. They include punctuation, comprehension, a crossword, and scanning for information. The adventure also encourages inference, note taking, problem solving and logical thinking, as do most good adventure games.

Typesetter! enables the publishing theme to be taken to its logical conclusion and for the class to produce its own newspaper. With it you can produce an A4 sheet in either normal or italic type. Though there is only one font, Times Bold, Sherston do say that further fonts will be available.

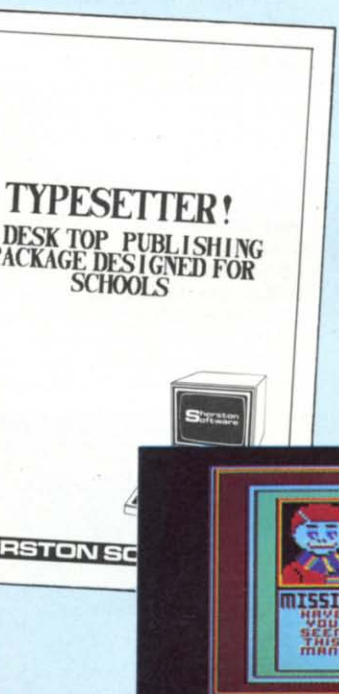
The package does not include any graphics but the text can be in either normal or in one of three sizes of headline type. Quite attractive results are possible by creative use of boxes and sizes, and there is nothing to prevent blank boxes being left for the addition of graphics before photocopying.

It took me a couple of evenings to get used to the package as I found the guided tour no substitute for a real attempt to plan and produce a dummy newspaper.

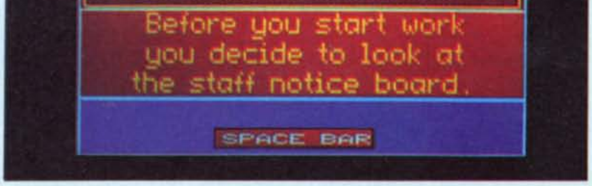
Typesetter! cannot compete with professional-quality packages with graphics, several fonts and lots of gimmicks. But then it would not be as easy to use or be something a nine year old could hope to work with. Instead it is a fairly robust, simple package which can produce a respectable result.

Most of the interaction with the program is through function keys calling pop-up menus within which options are chosen by cursor keys and Return. These are very easy to use and children have no difficulty in learning to deal with them.

The separate modules are referred to as Rooms, for instance printing is controlled from the Print Room, and one of the pop-up menus effects movement



The Daily News
THE FLEET STREET PHANTOM
SHERSTON SOFTWARE



Before you start work you decide to look at the staff notice board.

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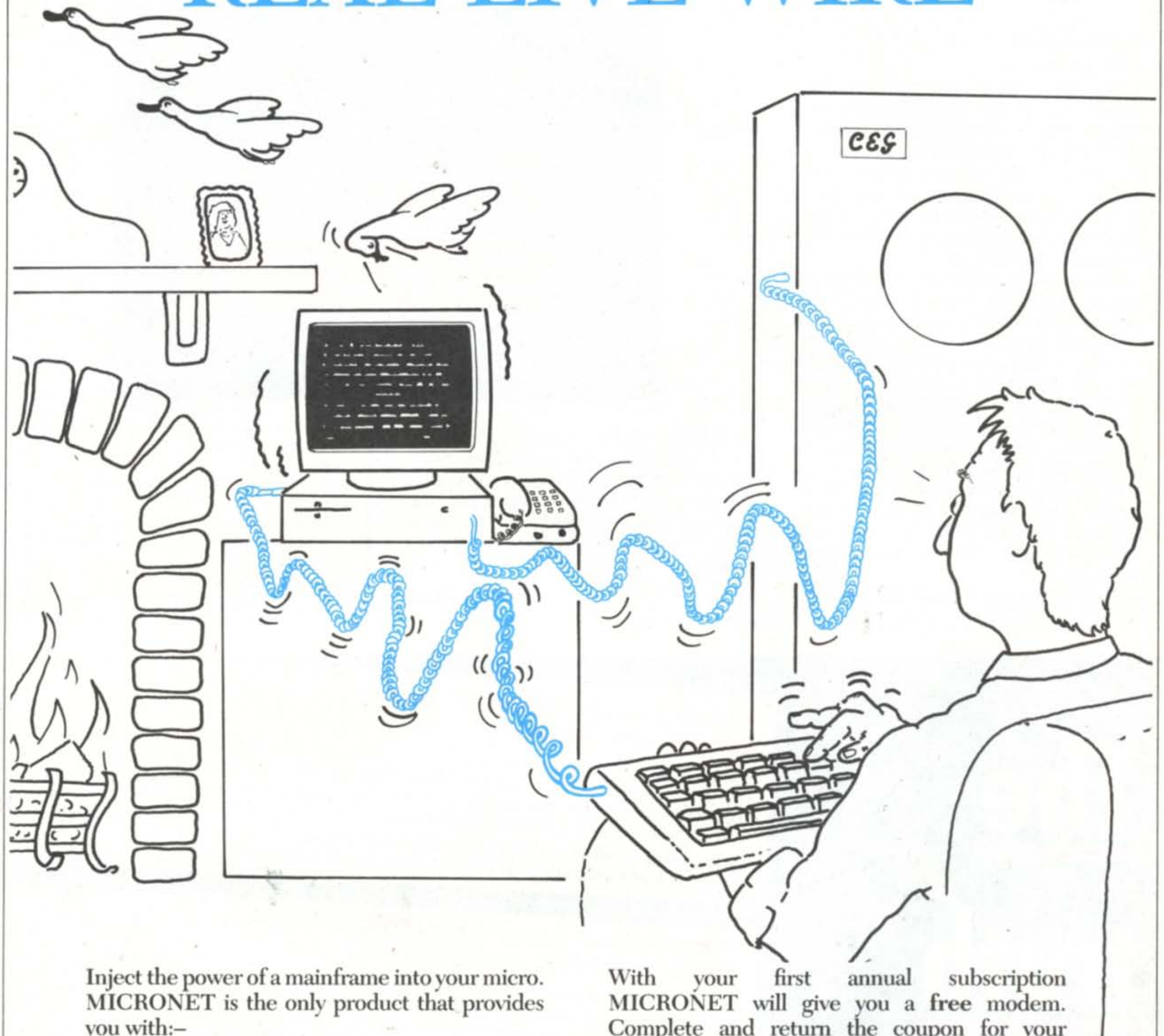

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◀ *From Page 84*

from room to room.

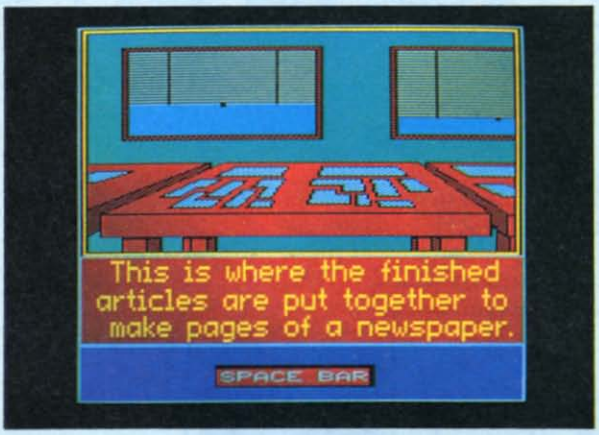
The main Typesetter! screen only shows part of the page and scrolling around it takes a bit of getting used to. But the Page Editor enables the page to be shown in 80 column format which means you can see across the whole width. You can enter text in this format, but real work should be done in the main section of the package.

The package supports a variety of printers. It didn't directly support the Epson-compatible I was using, but I found a setting that it was happy with and got a very nice print-out. You can alter the density of print – level four or five is recommended for Banda masters.

I found the suggestions for class work useful and imaginative – with ideas for introducing children to the package as well as for actually producing a newspaper. The ideas for further related projects overlap those for the Fleet Street Phantom but are nonetheless valid.

These packages are a useful and topical addition to any school's software library and from my experience very popular with the children. If you haven't got a printer the adventure game is still excellent. The pair could form the basis of a whole term's topic under many guises.

Elizabeth Denis



This is where the finished articles are put together to make pages of a newspaper.

Product: Typesetter!
Price: £31.60
Product: The Fleet Street Phantom
Price: £18.40
Supplier: Sherston Software, 8 Court Street, Sherston, Malmesbury, Wiltshire SN16 0LL.
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How to join: See Page 71

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in the BATTLEGAME SERIES

11th August 1940 . . .
Britain stands alone against the German war machine. In July, Adolf Hitler ordered his commanders to prepare plans for the invasion of Britain, named Operation Sealion. The German commanders insisted that they have air superiority over the Channel, or the Royal Navy could destroy the invasion force before it reached the shores of Britain.

BATTLE OF BRITAIN simulates the conflict that ensued. The player takes the place of the commander of the Royal Air Force, whilst the computer takes charge of the German forces. Under your command are the seven sector stations of Fighter Command. You receive reports from your radar stations on the coast, or if these have been bombed out of action, from the Observer Corps. Your forces are replenished from your fighter reserve and by production from aircraft factories — but you will lose both if the factories are bombed.
As if that were enough, bombing raids which penetrate your defences and reach your airfields will wreak havoc. All these and a host of other details are simulated by the Battle of Britain program.
Unlike 'Sink The Bismarck' and 'Tanks', 'Battle of Britain' does not include 'combat sheets' as the numbers of planes involved are so large, though it does use disc overlay techniques to allow a larger program.

Reviews:

"Full marks for simulations like this — an intelligent use of the computer that is never boring and doesn't require you to be a wargaming fanatic to enjoy playing . . . I do believe that many more of you would enjoy playing Battle of Britain than you might suspect . . . I'm eager to see the next in the series!" *A&B Computing, October 1987*

HAVE YOU TRIED BATTLEGAMES

Design People Software presents a unique series of battlegames for the disc-based BBC Micro. By using disc overlay and dynamic linking techniques, we are able to produce games which are much longer than the standard memory of the BBC. Our games are based on strategy, and we incorporate as many true-to-life facets of the action as possible. But you don't have to have reams of rules — everything is handled by the computer. But what makes our games different are the *combat sheets* — similar to mini-arcade games. You can take the place of the man on the spot, use your skills to influence chance.

TANKS is a World War II tank battlegame for 1 player. You have a choice of three spheres of action — Western Europe 1944, North Africa 1942 and Russia, Winter 1943. The program handles all of the complex rules for playing wargames, leaving you to concentrate on the strategy. Your tactics must deal with enemy tanks, mines, aircraft and fortified positions, while keeping your own tanks refuelled and achieving your objective. ***DISC £12.95 + £1.00 p&p***

REVIEWS:
"I don't know what the traditional wargaming fraternity will make of this, but I think it is excellent and, even more than *Sink The Bismarck*, will provide a wide audience to turn to a different sort of strategy game. I'm sure that this would appeal to far more of you than you suppose — try it and see!" *A&B Computing April 1987*
". . . this game is one of the best warfare simulations available on the BBC Micro. Highly recommended without reservation". *Acorn User, July 1987*
BBC B/B + /MASTER 128. 40/80 track dual format.

SINK THE BISMARCK is a simulation of the battle between the German super-battleship Bismarck and the Royal Navy. The game takes place over the whole North Atlantic. You have just twelve ships with which to find and tackle the Bismarck. But there are other problems too: U-boats, convoys to defend, and the ships' fuel reserves. ***DISC £10.99 + £1.00 p&p***

REVIEWS:
"Sink The Bismarck has the perfect balance between pure strategy and an arcade game" *Micro User January 1987*
"If you've never tried a warfare simulation then may I suggest that this would be a good place to start?
Well designed, playable and good value for a disc-based game." *A&B Computing December 1986*
BBC B/B + /MASTER 128 40/80 track dual format

All games are compatible with the BBC B,B+ and MASTER series. All orders will be despatched by return of post.

Design People Software, 77 Grimwade Street, Ipswich, Suffolk, IP4 1LN

EDUCATION LETTERS

Keep your letters coming in – the education pages are here to reflect your interests. We want to hear your tips, ideas, experiences and suggestions. Send your contributions to:

Peter Davidson, Education Editor, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport, SK7 5NY.

Missing materials

THE two Soft-Teach Educational programs you reviewed in the October issue of The Micro User *– Rural Rambles and Seaside Strolls – were, in fact, the "games" or "home" versions of our educational packages General Map Reading and Coastal Map Reading. These cost £20 + VAT each and are available to schools on 28 day approval.*

They are designed for nine to 14-year-old children and include the manuals, teaching suggestions and other teaching materials that your reviewer found lacking in the version he had. – **A.P. Ramsay, Soft-Teach Educational, Deverill, Wilts.**

Concept creations

WE use a Concept keyboard for children to enter data into the BBC Micro at the primary school where I teach. Unfortunately, there is a lack of software to use with it. All the programs we use are modified by one of the staff in the school and we can't use some of our software with the Concept keyboard because his modifications don't work.

Do you know of any software written for the Concept keyboard or a foolproof way of modifying existing software? – **Damien Rogers, Truro, Cornwall.**

● There is no certain way to modify all software – what works on one program will clash with memory locations on another. Also, loading routines on commercial software will often wipe out your routines.

Chalksoft has just released two programs that work with the Concept keyboard. Moveaword is for children aged from four to seven who are just starting to read and Numbers and Pictures is for four to six-year-olds and offers structured number activities.

If any of our readers have written short modifications for any educational programs we have already published in *The Micro User* and would like to share them with other teachers just send them in and we'll print them on the Educational letters page.

We'd also be very interested to see any educational programs that teachers or parents have written – especially if they cater for the Concept keyboard.

Electron conversions

I WOULD like to point out to other teachers that there are often educational programs published in Electron User.

They are easily converted to work on a BBC Micro and these, together with those published in The Micro User, *form useful additions to the software library at the school where I teach.*

Since April I have converted Animals, Dragon's Doom, Hungry Horace and Lemonade to run on the school's BBC Micro. It's been an easy task as the Basic is the same and only odd alterations like changing delays has been necessary.

While The Micro User *is essential reading in all schools with a BBC Micro I think that teachers should take out a subscription to* Electron User *as well.* – **David Leech, Reading, Berks.**

Software reference

I'M sure I can't be the only teacher in the world who has problems with children who press the wrong keys (deliberately or not) in educational programs.

The majority of software we use at school just goes to pieces if the wrong key is pressed and I have to spend my time leaning over the shoulders of the group currently using the micro, instead of being able to get on with class work with the rest.

What's wrong with programmers, don't they know what children are like?

In addition, could you please publish a list of proven (by teachers in a school environment) software, with the age groups and ability ranges? – **Shelley Gibson, Dukinfield, Tameside.**

● We would very much like to compile a list of good software, but we'll need help. Please write in and tell us about any software that you've used and found useful in an educational environment.

We'll need details like the name of the software and the manufacturer, the age group/ability range it was used with plus any other notes specific to the circumstances it was used with.

We would also be interested to hear of any products that you've found useless when they've been used with children.

Rhyming dumps

I RECENTLY purchased the Nursery Rhyme software from Database. The graphics and sounds are outstanding and it's interesting to see traditional themes brought into the electronic age.

It seemed a pity that my class could only make use of the package once a week when we have access to the school's BBC Micro, so I tried to print some screens using the key triggered dump in Watford Electronic's Dump Out 3.

I just entered:

```
*GIMAGE EPS K
```

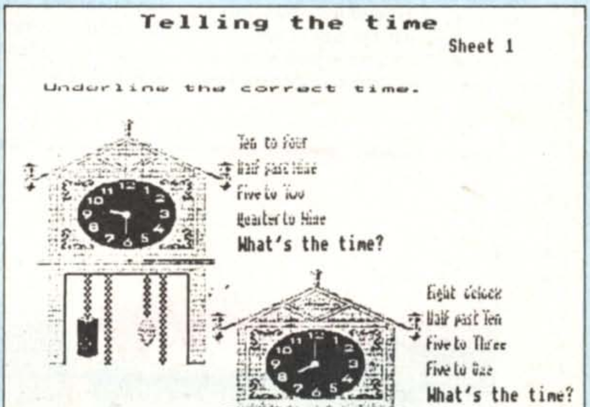
then loaded the Nursery Rhyme software with:

```
*RUN !Boot
```

because Shift+Break would have erased the GIMAGE command. I could then dump any screen by pressing Control+Escape.

I have now made worksheets by using several screens from Hickory Dickory Dock and the children enjoy colouring other pictures taken from the package.

I've even used parts of the screens to brighten up other worksheets I've produced. – **Moira Zimmatore, Balham, London.**



Telling the time

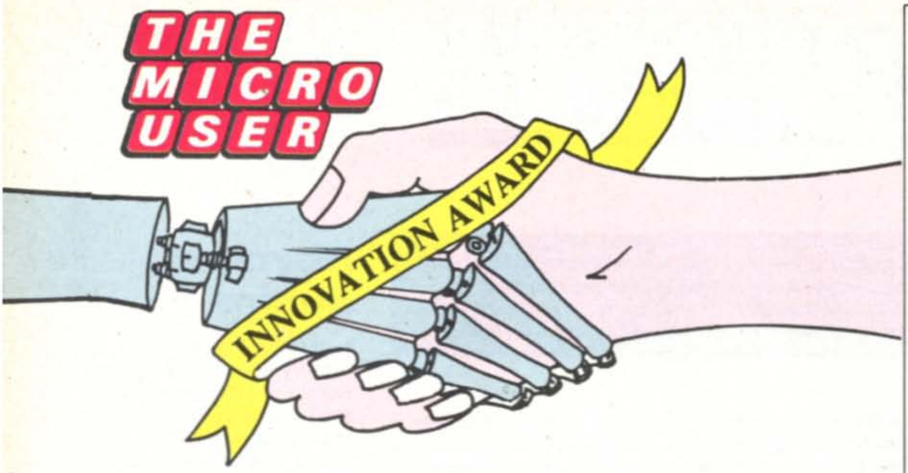
Sheet 1

Underline the correct time.

Ten to four
Half past Nine
Five to Two
Quarter to Nine
What's the time?

Eight o'clock
Half past Ten
Five to Three
Five to One
What's the time?

Reader Zimmatore's printout from Nursery Rhymes



THE great variety of remarkable tasks to which readers are putting the BBC Micro becomes clearer each month, as the flood of entries in our competition to find the most innovative use of the machine grows towards the 1,000 mark. Health researchers, into teeth and asthma, plus a design engineer working on missiles and two men offering spectacular entertainment feature in this random sample of the stories behind the competitors, all of whom are vying for a chance to win a £1,000 Archimedes.

Brushing up on research

RESEARCH which could cut down dental problems is being carried out on the North West around a BBC Micro.

Stockport research scientist Steve Kent explains that the B+ 128k in his laboratory monitors and analyses the forces used while brushing teeth.

"This may sound trivial but an important finding to date is that people do not compensate when cleaning teeth with a brush that is too hard. This means there is a good chance they are wearing away their gums".

Decay is no longer the reason for tooth loss; now it is gum disease and breakdown. The problem, Steve Kent has found, is that people are very habitual in this daily chore and so it is difficult to make them change their brushing style.

He explains how the system works. "Basically, a transducer has been constructed which can hold any toothbrush. Through the BBC Micro, it measures the forces generated during brushing. "Data is collected via an A/D converter for three axes simultaneously. Individual files are created for each brushing and are stored for later analysis.

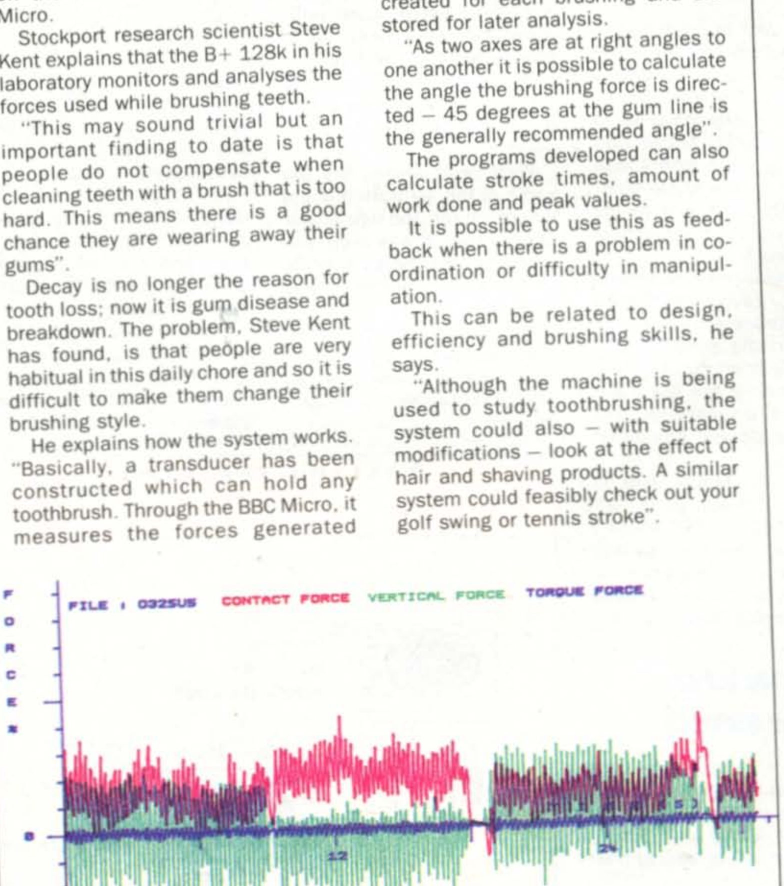
"As two axes are at right angles to one another it is possible to calculate the angle the brushing force is directed – 45 degrees at the gum line is the generally recommended angle".

The programs developed can also calculate stroke times, amount of work done and peak values.

It is possible to use this as feedback when there is a problem in coordination or difficulty in manipulation.

This can be related to design, efficiency and brushing skills, he says.

"Although the machine is being used to study toothbrushing, the system could also – with suitable modifications – look at the effect of hair and shaving products. A similar system could feasibly check out your golf swing or tennis stroke".



Laser show

THE sky's the limit for the BBC Micro – in the hands of maintenance engineers David and Derek Rose of Banbury. For they use the machine as a laser light show controller, providing spectacular displays.

The greatly expanded BBC Micro calculates and sends analogue signals to a remote laser scanning head which they built themselves.

The scanning head houses the laser and beam-pointing equipment which can draw any desired pattern or graphic by steering the laser beam along a path calculated by the BBC Micro.

The scanning device has a very fast response and is driven using a machine code program, making the projected graphic appear without flicker.

"Because the machine is so versatile and easily expanded, and so makes hardware and software development a fairly simple process, we can provide a laser show at affordable cost", say the Roses.

The machine code routines rotate, spin, tumble, grow, rove and animate the graphics to provide a dynamic effect.

"Messages can be typed and then scrolled across the projection area. "We hope to make this a full time business so that anyone coming across a 100-foot skeleton dancing in the sky in Banbury should not take fright – just think of the humble BBC Micro working away below".

March of the robots

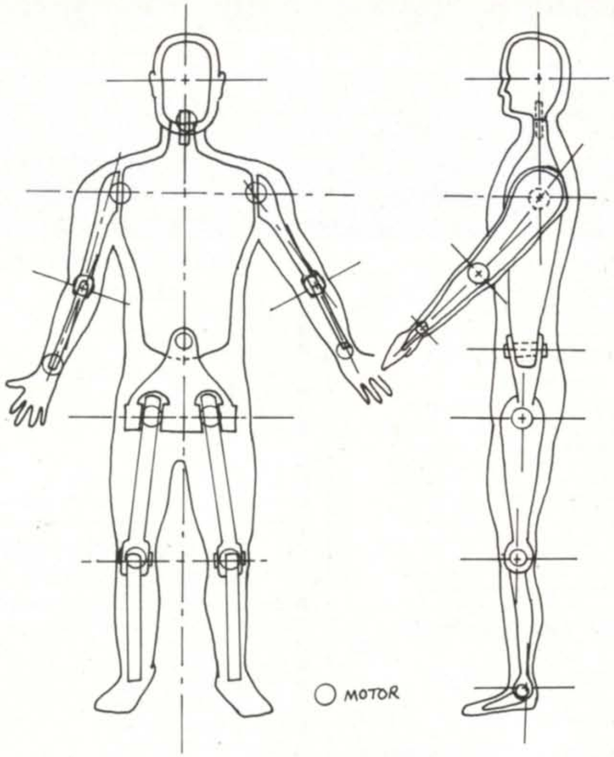
STAFFORDSHIRE student Carl Hodges has produced a design for a humanoid robot, controlled by a BBC Micro. He has been designing robots for two years now and has successfully completed a working turtle.

His humanoid would be prepared in three stages. The program would be a control device for switching motors on and off according to feedback from the robot itself.

The interfacing would involve fitting new chips, an ultrasonic transmitter and receiver.

Within the robot would be a small pointer positioned between two plates. If the humanoid started to fall, the pointer would make contact, transmit the situation and trigger compensating motors. All this would enable the robot to complete a task without falling over.

"Hopefully, this might promote British engineers in the field of robots for fun or for serious applications", he says.



Error trap

COSTLY errors in the minute detail of missile design are being detected by a BBC Micro before actual testing takes place.

Mechanical design engineer Timothy Giles has worked out a new way of employing computer modelling to generate a mathematical representation of actual test environments.

He starts by preparing a mathematical model for the mechanism under development.

Raw data describing the environment in which it will work is then fed into the BBC Micro after which a conversion program translates it into a meaningful form and stores it on disc.

Modelling software then accesses this data and uses the actual test levels for performance analysis.

"The beauty is", says Timothy Giles, "that additional environmental conditions which cannot be achieved by a test laboratory can be defined mathematically and added to the model.

"This achieves a simulation closer to actual use than any other method. "Test failures can be examined by the program to determine the cause. The effects of design changes can also be carried out.

"The system has proved cost effective in accurately predicting performance of the mechanisms before actual tests are carried out", he explains.

Research into asthma

CHILDREN's doctor John Storr believes his BBC Micro-based research has produced some entirely new findings into the causes of asthma.

The illness appears to be on the increase, says Dr Storr, and has become a frequent reason for admitting children into hospital.

"One area which has been particularly fruitful, and which would be quite impossible without the help of a computer is the analysis of the large volumes of data that are collected by the NHS for managerial purposes.

"The data I have been looking at are very simple, consisting of the ages and dates of admission of children with asthma.

"By processing large volumes of data it is possible to draw meaningful conclusions such as the clustering of admissions on particular days, seasonal and other long term variation in admission rates and the overall tendency for admissions to increase".

He says that one result of the work is the entirely new finding that asthma admissions show a strong association with school holidays.

"I have shown that this is a result of the effect that school holidays have on the spread of virus infections in the community. New strains of virus are imported by children returning from holiday, and when these spread among the school population the asthmatic children become wheezy.

"This achievement shows what a remarkably powerful tool the computer can be, as it is very difficult to show by any clinical test that an attack of wheezing has been caused by a viral infection. This is because the asthma is a sign of an overactive defence mechanism which soon kills off the virus, even though the wheezing may persist for a while afterwards".

The winner of this prestigious award will be announced at the Electron & BBC Micro User Show, opening at the New Horticultural Hall, Westminster, on November 13.

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BBC MASTER with Turbo Board **£486**

512K Processor Add on Board "inc. Mouse and GEM package"	£195
BBC AIV (Domesday) System	**£4479**

ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module		£99
BBC MASTER ET (Econet Terminal)		£315
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Twin ROM Cartridge for Master		£8
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Acorn 1770 DFS Kit complete		£42
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Z80 Acorn 2nd Processor package		£325
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All Master Compact Microcomputers are supplied complete with an integral 3½" Disc Drive and various educational and professional bundled softwares.

System 1	Standard Package	£295
System 1A	System 1 + TV Modulator	£310
System 2	System 1 + Green Hires Monitor	£340
System 3	System 1 + Medium Res Colour Monitor	£475

RS232 Kit for BBC Compact	£26
Additional 3½" Drive for BBC Compact	£99

(Securicor carriage £7)

The 80186 Co-Processor

This package consists of the Master 512 board, Watford Co-Pro Adaptor, Acorn 1770 Disc Upgrade and Acorn ADFS. The Master 512 board using the 80186 16 bit Processor at 10MHz and running Digital Research DOS Plus, gives a high degree of IBM compatibility at an extremely reasonable price. Included in the 512k package is a mouse and the amazing Digital Research GEM suite of software; GEM Paint, GEM draw and GEM desktop giving a complete Mouse Icons environment (All other GEM packages will work on the 512k). Famous packages that will work with the 512k board include Wordstar, Dbase II, Lotus 123 and many others. The only requirement to upgrade any BBC Model B to this system is you must have twin 80 track disc drives.

£275

ARCHIMEDES Micros

Model 305

● Basic System	£799
● with Green Monitor	£849
● with Colour Monitor	£999

Model 310

● Basic System	£875
● with Green Monitor	£925
● with Colour Monitor	£1075
● Podule Backplane	£39
● Archimedes Ref Manual	£20
● ARM Assm. Lang. Prog Manual	£12

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(Securicor Carriage on Printers £7

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All these interfaces fit inside the printer.

RS232	£27	RS232 + 2K Buffer	£55
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PRINTER SHARERS

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2 BBC Micros to 1 Printer	£25	£26
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3 Printers to 1 Micro (Centronics)	£65

(Cables extra, specify type required when ordering)

65C102 2nd PROCESSOR

This amazing package consists of the Acorn 65C102 'Turbo' Board, the Watford Co-Pro Adaptor and Acorn 1.2 DNFS ROM. The 'Turbo' board, running at 4MHz with 64k of additional RAM will increase the speed by between 50 and 200% depending on the application running, and allow a BASIC program of upto 44k in any screen mode. Simply by plugging in the Co-Pro and the DNFS ROM with its special Tube host code and you massively increase the power of any Model B.

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FX100/1000	£7.00	–
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LQ2500	£9.00	£5.50
LX80/86/800	£4.00	£4.50
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(On continuous fanfold backing sheet)

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EPROMs for BBC's Sideways ROMs.

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RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

6264LP (8K) £2.50
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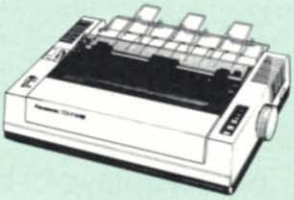
Panasonic KX-P1081

(Now IBM/Epson Compatible)



Available NOW at a superbly realistic price, the KX-P1081 perfectly balances features, quality of construction and Value for Money to produce the printer of tomorrow, here today, ready to sweep the current generation of machines away.

Ingenious innovation in terms of software control codes permits great flexibility when it comes to defining the print style. A nippy **120 cps** of clear Draft text backs up the crisp 24 cps Near Letter Quality text mode, with upto 40 superbly useful downloadable characters. A delightful range of assorted character widths is efficiently supported, with sizes ranging from a broad 5 cpi to petite 17 cpi, EVEN in NLQ mode. Some of the extensive support for serious use includes specialised functions to perform justification, centering and even left and right ranging. Proportional spacing permit even greater freedom when it comes to advanced use. Not only is the full Epson RX compatible control code set implemented, but extra codes have also been added to cater for the NLQ options, etc.

A full 96 ASCII character set is supported, with an extended set of 32 international characters and IBM special characters as well as IBM block graphics characters. A 1K Print Buffer alleviates much of the wait time normally associated with printing, whilst the bi-directional logic seeking print head takes the quickest route to print as required.

(Price inludes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

Special Price: **£149** (carr. £7)

Optional RS232 Interface: **£39**

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Single Sheet Feeder	**£195**
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Acorn-Olivetti JP101 Ink Jet Printer

One of the main problems with most printers is that they are hopelessly noisy. How often have you wanted to print something late at night but not done so for fear of waking the children? Also ideal for those working in quiet environments such as libraries, etc. Silence the complaints with the serious solution from Watford at the amazing cost of only **£59**

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JP101 accepts 9½" standard fan fold paper or single A4 sheets. Tractor & Friction feed supplied as standard – print speed 50 cps.

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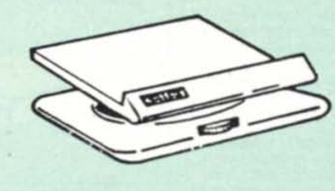
for Video Monitors



By placing your monitor on one of our superb swivel bases, you gain the freedom to adjust the monitor viewing angle to suit your needs. By doing this, you alleviate eye strain and reduce back stress. Front adjustable without lifting the monitor. (See drawing on left).

for 12" Monitors **£10** (carr. £2.50)
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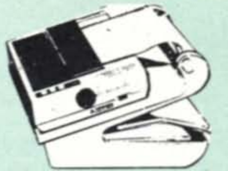
Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

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● 1431 – Medium resolution as used on the BBC television computer programme	**£175**
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● TAXAN KX118 Long persistence Hi-Res Green Monitor	**£85**
● TAXAN KX119 Ultra-Hi-Res Amber Monitor	**£90**
● TAXAN Super Vision 2 **Type 620** Hi-res RGB Colour monitor. Ideal for Wordprocessing	**£269**
● **TAXAN Super 3, Type 625** Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue	**£319**

ZENITH

"Test Bureau Recommended for use in Education"

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith PC Systems.)

Green (New Design) Hi-res	**£69**
Amber (New Design) Hi-res	**£74**

LEADS

BNC Lead for Zenith or Philips	**£3**
Skart Monitor Lead	**£5**
RGB lead for KAGA	**£3**

N.B. carriage on Monitors **£7** (securicor)

MEGABUFFER 256

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Low Cost, High performance.
- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

Only £125 (carr. £3)

CO-PRO Adaptor

CO PRO ADAPTOR

Now for the first time you can add the Master Co-processor boards, to your standard BBC model B, or B Plus. With this brand new launch from Watford Electronics you can attach any BBC Master co-processor to the original BBC Micro. Once again Watford strides ahead with a new concept in BBC B Micro add-ons. This unique external Co-Pro Adaptor, is protected by patent applications.

Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.

With the 512K addon your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. Included with the 512k package is a high precision mouse and the Digital Research GEM suite of software; GEM Desktop, GEM Write GEM Paint. This requires both the 1770 DFS and the ADFS to be fitted to your computer.

To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.

Master owners may use Co-Pro to add a second Co-processor externally.

Watford, brings power to your BBC at only:

£50.00 (carr £5)

Continued →

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED (BOOK)

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

If you already have the Watford Electronics DFS and wish to incorporate these new facilities then simply return your existing DFS ROM to us together with £5 remittance for an upgrade. Please pack the ROM securely and address the package to our Upgrades Dept.

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for four years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS). (not Acorn's 1770 DFS)***

- *Complete Disc Interface Kit including DFS ROM and fitting instructions* **£46**
- *Acorn's 0.90 DFS Kit complete* **£45**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**
  (P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs).
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17** ● *ADFS ROM only* **£25**
- *Watford's DFS is exclusively available from Watford Electronics and their appointed dealers only. Every ROM carries a special label with LOGO and serial number.*

NEW WATFORD's Mk II Double Density DFS INTERFACE

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our DDFS board has been adapted to allow the use of Acorn ADFS.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

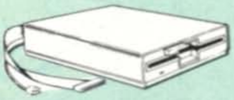
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£25.00**.

● Special introductory offer	**£39.00**
● DDFS Manual	(No VAT) **£6.95**
● We will exchange your existing DFS Kit for our sophisticated DDFS for only	**£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

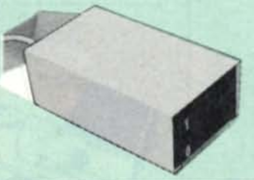
SPECIAL DISC DRIVE/DDFS OFFER

Type CLS400



- The popular Mitsubishi 400k Single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's popular DDFS Disc Interface (allows 720k storage). Will run in both Single and Double Density modes 40/80 track Software switchable.
- A comprehensive User Friendly Manual.

A Bargain at Only **£125** (£6 carr)
(Offer valid while stocks last)



3½" DISC DRIVE OFFER

These top quality 3½" Disc Drives are attractively finished in BBC beige and are supplied complete with Cables. They run directly from the BBC B/Master's own PSU.

● Single 400K Drive	**£69**
● Twin 800K Drives	**£126**

MYSTERIES OF DISC DRIVES & DFS REVEALED (BOOK)

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

FLOPPY HEAD CLEANER KIT

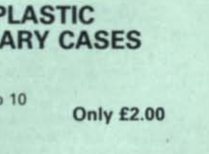
The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

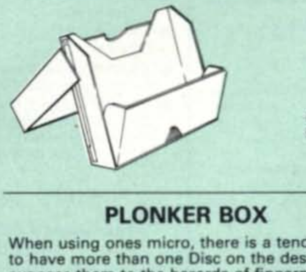
£7

ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection –
Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

● **M35** - holds upto 50 5¼" discs	£6.50
● **M85** – holds upto 95 5¼" discs	£8.00
● **M25** – holds upto 25 3½" Discs	£5.50
● **M50** – holds 50 3½" Discs	£7.50





PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

PLONKER BOX

When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost PLONKER BOX. It holds up to eight 5¼" Discs.

Protection at Only: **£2**

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

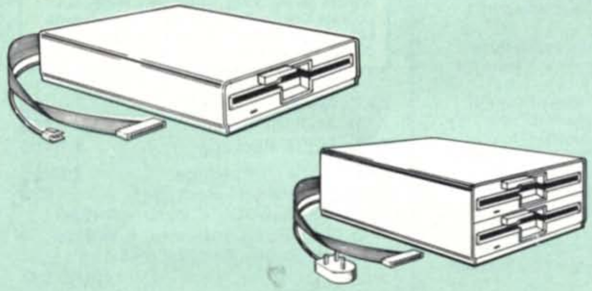
***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 6th page of our advert for the Plinths).
P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £90		CS 200 £102	
400K (720K)	CLS400S £92	CLD 400 £175	CS 400S £103	CD400 £196
800K (1.44M)		CLD 800S £179		CD 800S £198

- TWIN Disc Drive Case, complete with Power Supply & Cables **£43**

Securicor carriage on Disc Drives £5 to £6

*Prefix **C** = Cased Drive*
***L** = Less PSU*
***S** = Single*
***D** = Double*

*Suffix **S** = 40-80 Switchable*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

● *10 × 5¼" S/S D/D 40 Track Diskettes*	***£8.50***
● *10 × 5¼" D/S D/D 40 Track Diskettes*	***£10.50***
● *10 × 5¼" S/S D/D 80 Track Diskettes*	***£13***
● *10 × 5¼" D/S D/D 80 Track Diskettes*	***£13***
● *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT and AT*	***£28***
● *10 × 3½" S/S D/D 40/80 track Discs*	***£15***
● *10 × 3½" D/D D/D 40/80 track Discs*	***£19.50***

TOP QUALITY 3½" & 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

● *10 × **M3** 3½" D/S D/D 80 Track Discs*	***£18***
● *10 × **M4** 5¼" S/S D/D 40 Track Discs*	***£7***
● *10 × **M5** 5¼" D/S D/D 40 Track Discs*	***£9***
● *10 × **M7** 5¼" D/S D/D 80 Track Discs*	***£11***
● *3" Double Sided Discs*	***£3 each***

Special BULK OFFER on 5¼" DISCS

PRICES SLASHED

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£35	£39	£45
● With Sleeves	£38	£42	£48

ACORN WINCHESTER DRIVES

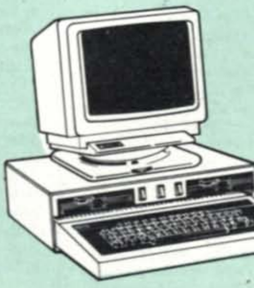
Supplied complete with Level 3 Econet File Server software.
20 Megabytes **£699**; **30 Megabytes £1549**

PRICES SLASHED

WATFORD's WINCHESTER DRIVES

● 10 Megabyte Unit with ADFS	**£399**
● 20 Megabyte Unit with ADFS	**£499**
● 40 Megabyte Unit with ADFS	**£749**

CDP800S **CDPM800S**



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £199
CDPM 800S for Master £205
(Securicor Carr. £7)

ACORN'S Twin 800K Disc Drives

Specially mounted side by side in a Master Plinth. Supplied complete with Cables. Plugs directly to the Master Computer.

RRP ~~£250~~ **Our Price: Only £189** (carr £7)

NOMINATED FOR
BRITISH MICRO COMPUTING AWARDS
1987

QUEST MOUSE

QUEST MOUSE

The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and is smooth and easy to use on most work surfaces. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that programs such as AMX Pagemaker etc, will work with it.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

Take The Guesswork Out of Selecting a Mouse Package
With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87
"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."
"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."

Micro User June '87
"Quest Mouse and Quest Paint can hold their heads high in the market. . ."

A&B Computing June '87
". . . Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package. . ."

". . . you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias – a pleasure to use."

"What we have here is probably the best art package there is for the BBC Micro . . ."
"Quest Paint is a major leap forward in BBC programming. . ."
"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".

Acorn User, September '87
"The mouse (Quest) performs well in the face of competition from AMZ, Wigmore and the rest . . ."
". . . this package represents excellent value for money. If you are interested in art then this program is for you to buy".
"Given time, I can see no reason why Quest Paint shouldn't take on the title of the definitive art package available for the BBC Micro to date".
"All in all, Quest Paint is a very professional package. It contains virtually every feature the budding artist could require".
"What makes Quest Paint so versatile is the addition of a sub-menu which allows you extensive control over each function".
"Until recently, Superart from AMS had been judged as the definitive mode 1 graphics package for the BBC micro. But now it has a serious rival in the form of Quest Paint, from Watford".
"As a measure of what is contained within Quest Paint, I would say it had all the features of Superart plus . . ."
"In most art packages, provision is given for drawing triangles and rectangles. Quest Mouse goes 14 better, allowing any regular polygon of upto 16 sides".
"One facility, not found on any other Art package to my knowledge, is the ability to access a digitiser from within the program".
The reviewer concludes by saying, "The result is an extremely comprehensive and professional art package".

QUEST MOUSE & QUEST PAINT	***£59***
QUEST MOUSE, QUEST PAINT, AMX PAGEMAKER & PAGEFONT	***£85***
QUEST MOUSE ONLY	***£29***
QUEST PAINT SOFTWARE	***£32***
QUEST FONT DISC	***£12***
QUEST MAT	***£3***
Part-exchange your old Mouse for a New QUEST MOUSE for only	***£23***

N.B.

1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.

2. Quest Font Disc has 24 text FONTS for use within Quest Mouse.

P.S. There is no need to worry about any of your existing AMX mouse software. The Quest Mouse is totally AMX compatible so it will work with any of the AMX range of software.

All prices in this advert are exclusive of VAT.

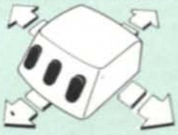
MARK II LIGHT PEN + PENPAL 2

Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.
Penpal II, Watford Electronics' sophisticated light pen software is also supplied free on cassette or disc (please specify). This is a highly sophisticated drawing package enabling you to gain the maximum benefit from your Light Pen. The software is used to edit Mode 2 full colour screens using lines, patterns and you own designs. Screens may be saved to cassette or disc.

Price Only £15

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

THE AMX MOUSE



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £59 (carr £1.50)
(Please specify for BBC or Master Computer)

We are giving away, absolutely **FREE**, our popular Colour Art software package worth **£15** with every AMX Mouse package purchased from us.

AMX MAT	**£3**
AMX MOUSE ONLY	**£29**
AMX DESK Package	**£19.00**
AMX UTILITY Package	**£11.00**
AMX SUPERART Package	**£39**
AMX PAGE-MAKER Pack – A desk--top publishing software. It Works with keyboard, joystick and a mouse	**Only: £32**

We are giving away, absolutely FREE, PAGE-FONTS, a disc containing over 20 fonts, with every purchase of AMX PAGE-MAKER from us.

PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	**£9.50**
AMX DESIGN (ROM)	**£59**
AMX 3D ZICON Disc	**£19**
AMX Database Disc	**£19**
AMX Stop Press	**£39**
AMX XAM Educational	**£19**
AMX MAX A gem of desktop	

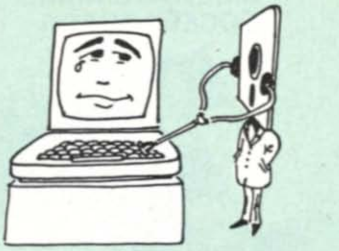
RB2 Marconi Tracker Ball

Complete with Software Disc	**£59**
RB2 + Software Disc + Quest Paint	**£85**

FLEET STREET EDITOR

Software pack for BBC/Master	**£36**
Software Pack for Compact	**£40**
Admin Xtra Disc Utility	**£13**
Walt Disney Disc Utility	**£13**
Fonts N Graphics Disc Utility	**£13**

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

OFFICE MASTER

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE

- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features.

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

TED

THE ULTIMATE TELETEXT SYSTEM

TED is one of a new generation of powerful 32K ROMs for the BBC B, B+ and Master computers and is compatible with disc, tape and network systems. It is in everyday use in schools, colleges and universities, Programmers, Prestel I.P.'s, Micronetters and exhibitors have also found it indispensable.

TED includes the most comprehensive teletext (Mode 7) screen editor ever written for the BBC micro, combining flexibility with ease of use. Its sophisticated facilities include line, column and block copying within AND between frames; text, in a variety ofstyles and sizes, entered directly from the keyboard; graphics and line drawing modes; search and replace; margins; printer dump routines and a library of in-built icons and typefaces. TED will edit ANY mode 7 screen and can even convert high-res graphics screens to mode 7! Included within the ROM is a fully Epson compatable mODE 7 graphics dump routine giving a grey scale printout of exactly what appears on the screen.

Using '*SHOW' (a versatile carousel), collections of mode 7 screens may be 'routed' or displayed sequencially, making it ideal for creating andrunning 'Viewdata' information systems. Over 1200 frames may bestored on a twin 80 track drive. A unique feture of TED is '*SCROLL', which lets you create pages of up to 600 lines which may be viewed 'Wordwise style', automatically or manually. SHOWs and SCROLLs may be freely mixed and even used from within a BASIC program.

The package comprises a 32K ROM, a 117 page manual, a function-key strip and a demonstration disc containing examples of real-time animation and a sample 55-frame database. A stand-alone machine code routine is provided allowing SHOWs and SCROLLs to be displayed on machines not fitted with TED.

Price: £35

ROM-SPELL

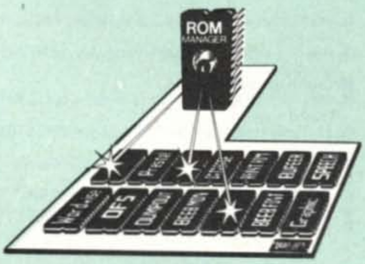
ENGLISH DICTIONARY
ROMSPELL

Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.

NOT compatible with 1770 DFS.
(Please state 40 or 80 track disc)

Price still only: £25

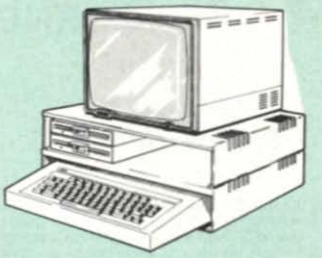
ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

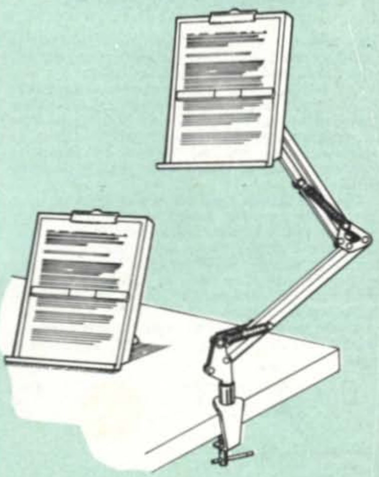
PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£19** (carr. £3.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£24** (carr £3.00)

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip. Both units are full A4 size.

Amazing value at only
Desk Top **£10** (carr. £2)

Angle poise **£14** (carr. £3)

Continued →

ARIES CORNER

The Aries B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: **£80** (carr. £2(

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price:	Aries B-12	**£40**
	Aries B-12C	**£5**

ARIES B-488 IEEE-488 INTERFACE UNIT

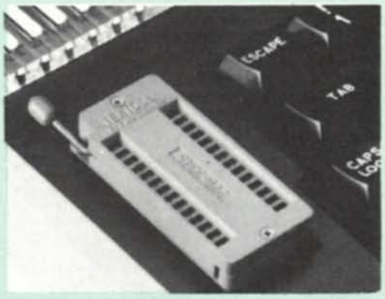
The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

GRAPH PAD 2

Supplied complete with Software
£60 (Carr. £3)

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack.

● Complete System	**£11**
● Spare Cartridges	**£2.50**
● Spare Rack	**£1.50**

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.

Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

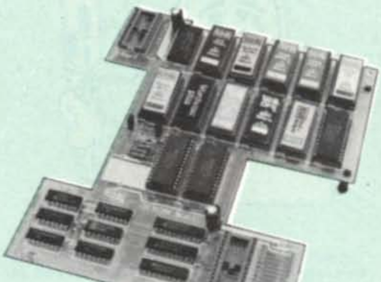
Only: **£24** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

All prices in this advert are exclusive of VAT.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

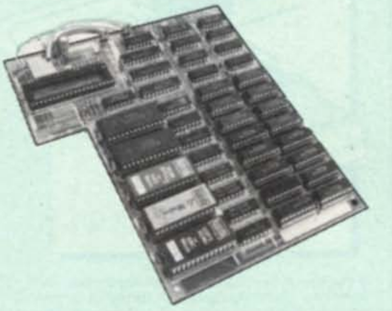
USER PORT SPLITTER UNIT

User Port Splitter
A
B

Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£19**

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

● *ROM/RAM card with 32k dynamic RAM*	***£39***
● ROM/RAM card with 64k dynamic RAM	***£52***
● ROM/RAM card with a massive 128k dynamic RAM	**£80**

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

● *16k plug-in Static RAM kit*	***£6***
● *16k Dynamic RAM for Upgrade*	***£7.50***
● *Battery backup*	***£3***
● *Read and Write protect switches*	***£2 each***
Complete ROM-RAM board All options installed	***£89***

P.S.

Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £10 less

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***

SPECIAL OFFER

Price: ***£84***
(carr £3)

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Nightingale Modem

SPECIAL PRICE to our Customers

£82

(Price includes: Nightingale Modem, Commstar ROM pack & Comprehensive manual)

Nightingale Modem without software	**Only £75**
COMMSTAR ROM package only	**£29**

(P&P on modem £3.00)

APOLLO

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Only: **£84** **(Carr £3)**
(Write in for full specification)

Minerva Systems Software

System Delta with Card Index	**£55**
System Programmers Ref. Guide	**£19**
System Gamma	**£43**
System Gamma Prog, Ref, Guide	**£19**
System Mailshot	**£17**
System Reporter	**£17**
System Intrer/View Link	**£17**
System Sales Ledger	**£39**
System Purchase Ledger	**£39**
System Nominal Ledger	**£48**
System Stock Management	**£39**
Order Processing/Invoicing	**£39**

Versatile **BEEB SPEECH SYNTHESISER** Unit

Beeb Speech Synthesiser

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£48
CARETAKER Basic Utility	£25
DISC DOCTOR	£28
Graphics ROM	£23
TERMI	£25
COMMUNICATOR	£49
SPEECH ROM	£24
Printmaster	£24

Wordwise £24

Wordwise plus

WORDWISE PLUS
£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £47

Inter SHEET ONLY £37

INTER-CHART ONLY: £26

Inter-WORD

Only: **£39**

INTERBASE £55

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	£37
VIEW 3.0 ROM	**£54**
VIEW PROFESSIONAL	**£79**
HI-VIEW (for use with 6502 2nd Processor)	£36
VIEW Printer Driver Generator Please specify Disc or Cassette)	£9
VIEWSHEET (Acornsoft)	£37
VIEWSTORE	£37
VIEWSPELL with 80 track disc	£29
VIEWPLOT Disc (Please specify for Master 128 or Compact)	£22
VIEW-INDEX	£12
OVERVIEW Packs 1 & 2 for the Master	£75

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8
Silver Reed Printers (Disc)	£8

Micros in Business (Disc)

An introduction to Business software for the BBC Micro from Acorn **£43**

ADVANCE COMPUTER PRODUCTS' ROMs

Adv. Disc Toolkit	£29
Adv 1770 DFS for Mast/Compact	£29
Adv 1770 DFS for BBC/BBC+	£29
Adv Disc Investigator	£24
Adv. Control Panel	£29
Adv. Rom Manager	£13

MINI OFFICE II

Disc Version	£14.50
ROM Version	£48.00

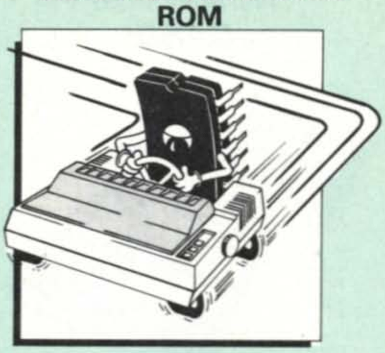
REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

Acorn's Speech Synthesiser package, complete
Special Offer £18

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

EPSON NLQ ROM
for the BBC Micro

Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM £7

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- *Vertical and horizontal scaling in all graphics modes and mode 7*
- *Rotation of image by 90, 180 or 270 degrees*
- *Left hand margin setting*
- *Screen dump window setting*
- *Colours appear as grey scale*
- *Two tone fast dump*
- *Colour mask*
- *Mode 7 contrast expansion*
- *Mode 7 contiguous dump*
- *Key triggered and User Port triggered dumps*

The Micro User Feb. 1985.
'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten".

For use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1080, Mannesman Tally and compatibles.

Only: £25

(Write in for further details on all above ROMS)

THE EUREKA CARD

(The Unique RAM Expansion System)

The Eureka Card is Watford's latest and most sophisticated RAM expansion system. Using advanced PAL based technology this card is a breakthrough in RAM systems for the BBC micro. The Eureka Card provides the user with around 58K of free memory in Basic, VIEW and WORDWISE PLUS. You also get Shadow RAM from within the active language. No other RAM expansion system can match that!

Load up to 58K long Basic programs. Texts in VIEW and WORDWISE PLUS up to 58K as well. This with absolutely NO loss of speed in accessing your text or program. Eureka consists of a card containing 64K of program memory, two parallel banks of sideways RAM and some extremely complex switching circuitry. This is all controlled by Eureka's highly sofisticated software supplied in ROM. Designed to a very high specification, this board is fully buffered to give reliable operation under virtually any circumstances.

The Eureka board plugs into the 6502 socket and has NO messy flying leads. It is compatible with many other products from Watford, such as our Solderless ROM Board and our ROM/RAM Board. All in all, the Eureka Card is an amazing board. Jump into the age of serious data processing with a Eureka Card! Please write in for further details 'on advantages the Eureka can offer you'.

Introductory price: Only **£89** (carr £3)

(P.S. Eureka is only suitable for a standard model B; it normally replaces any Shadow RAM cards present. Some speed degredation does occur with filing system access. Eureka cannot be used at the same time as a second processor).

BEEBMON

The most powerful machine code monitor for the BBC Micro **£24**.

THE NLQ DESIGNER

(The First & still the Best) Supplied with over 25 Different fonts

A massively useful utility for users of the Taxan/Kaga KP810/910 or the Canon PW1080. This program allows you to define NLQ character sets to download into the printer's memory. Full on screen editing of the font. Requires 6264 RAM chip to be fitted in the printer.
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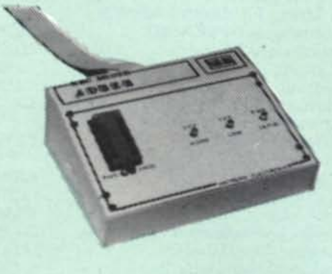
ADDER



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32K

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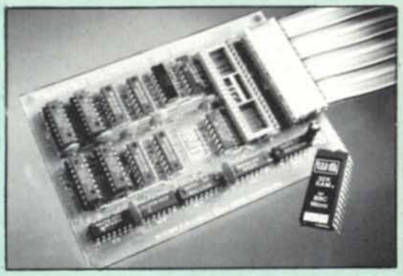

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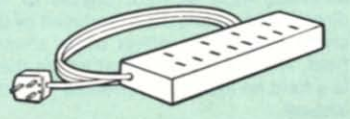

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ORDER VIA MicroLink 72:MAG030

Mike Cook shows how to link liquid crystal displays to a BBC Micro

CRYSTAL CLEAR

SOME Bodybuild articles present a complete project, others provide a springboard for your own work – but this one might just put you off approaching the springboard altogether. Let me explain.

It all started with a letter from a reader who wanted to know why he had to spend £25 plus for a real time clock when he could buy a digital alarm clock and calendar for much less than half that amount. He asked me how to interface such consumer electronics to the BBC Micro.

Here's how to tackle the problem of getting your computer to read the values on LCDs (liquid crystal displays). It is quite open ended and could make a very interesting project, especially if you have access to a variety of inexpensive consumer electronic items.

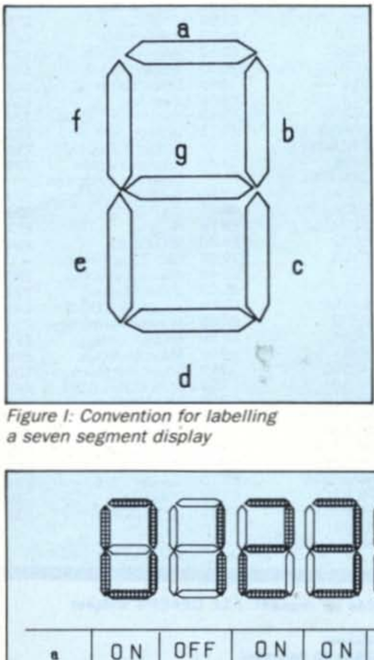


Figure I: Convention for labelling a seven segment display

Most displays used in consumer electronics have a liquid crystal system. They have the advantage of being very low cost and take a tiny amount of power to drive.

Their major disadvantage is poor contrast and restricted viewing angle. They work, however, with millivolts so a computer should be able to read them.

Liquid crystal is strange stuff, consisting of long filaments of material rather like very thin needles. At room temperatures there is enough thermal agitation to scramble the crystals, so that they do not interfere with light and appear transparent.

The interesting property of a liquid crystal is that, when an electric field is applied across it, all the crystal filaments line up. These then interfere with the light so that, while it is still transparent, light passing through it becomes polarised. This means that the light that can squeeze through will be aligned in the same direction as the crystals.

Now for a little experiment: Take two lenses from last summer's polarised sunglasses and place them one in front of the other. If you rotate one you should reach a point where you can see through them both. They are then polarising the light in the same direction.

As you rotate one lens through 90 degrees the light passing through the lenses reduces because each lens is polarising the light in different directions. At 90 degrees there is minimum light throughput and we have crossed polarising filters. This is exactly what happens in a liquid crystal display.

A polarising filter and reflector are placed behind the liquid crystal that polarises light at right angles to the direction of polarisation produced by the crystals under the effect of an electric field. The net result is that where there is a field no light gets reflected from the display.

It is, therefore, very simple to make a display. Just paint the pattern you want to see with transparent conducting ink on both sides of a glass sandwich with a liquid crystal filling.

The problem comes when you try to make an electrical contact to the glass. Obviously it will not take solder so what is needed is some form of pressure contact. This is done with a rubber tube that has very fine concentric conducting rings.

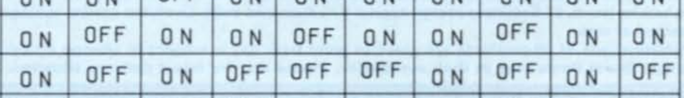
This tube is then held under pressure between gold plated fingers on a printed circuit board and the liquid crystal sandwich. Be warned that once this tube has been removed it is quite difficult, if not impossible, to replace with all the contacts intact.

Sometimes the pattern is drawn on the inside of the sandwich to allow the connections to be made from one side only.

The most common pattern for a display is the seven segment format shown in Figure I. The segments are lettered a to g (always lower case). However, any pattern can be drawn on the glass and sometimes whole words or phrases are produced.

In order to make numbers the seven segments must be controlled in the pattern shown in Figure II. If we want to read a number we have to let the computer sense which segment is on and which is off.

If you study Figure II you will see that segments c and d are not required as the other five segments form a unique pattern for each displayed number. If we can input these five segments to our computer then we can use a look up



a	ON	OFF	ON	ON	OFF	ON	ON	ON	ON	ON
b	ON	ON	ON	ON	ON	OFF	OFF	ON	ON	ON
c	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON
d	ON	OFF	ON	ON	OFF	ON	ON	OFF	ON	ON
e	ON	OFF	ON	OFF	OFF	OFF	ON	OFF	ON	OFF
f	ON	OFF	OFF	OFF	ON	ON	ON	OFF	ON	ON
g	OFF	OFF	ON	ON	ON	ON	ON	OFF	ON	ON

Figure II: Seven segment display encoding table

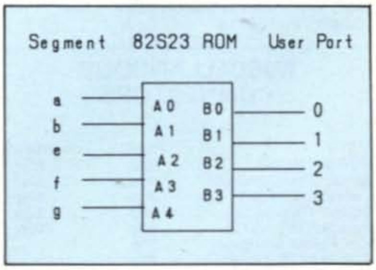


Figure III: Using a fuse link rom to reduce the number of input lines to the computer

THE BEEB BODY BUILDING COURSE

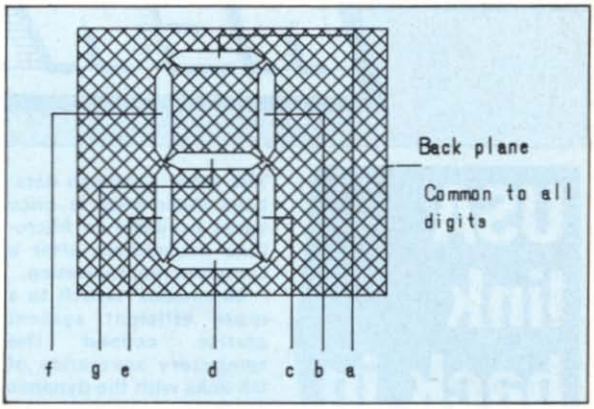


Figure IV: A conventional liquid crystal display

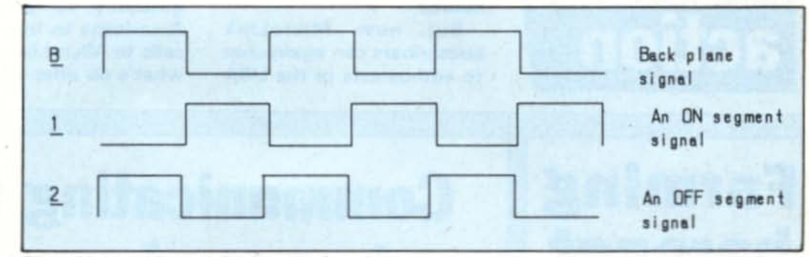


Figure V: Liquid crystal display waveforms

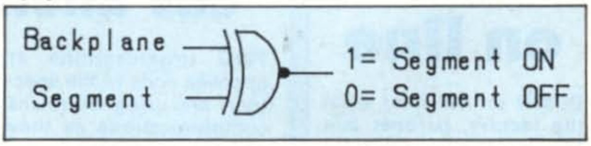


Figure VI: Circuit for recovering one segment from a conventional liquid crystal display

table in software to convert the bit pattern to the required number.

With only 10 different numbers we need only four input lines to uniquely define each number and so to save a computer input line we could decode the segment bit pattern using a small fuse link rom as shown in Figure III. This would allow two digits to be read on an eight bit port.

So all we have to do is sense each segment and see if it is being turned on or off. And there, as the Bard put it, lies the rub.

You see, a liquid crystal display requires an AC electric field to work and to make matters worse there are a number of different ways of generating that field.

Let's start with the simplest form of display shown in Figure IV. This has one connection for each segment and a common connection for all the digits called a backplane. The backplane is fed with an AC signal and segments that are to be on are fed with a signal 180 degrees out of phase with this, whereas segments that are off are fed with a voltage in phase with the backplane. This is shown in Figure V.

So, to detect which segment is on, we have to find whether it is in or out of phase with the backplane. Fortunately this can be done very simply using an Exclusive OR gate as shown in Figure VI.

However, many consumer electronic devices do not work from 5 volts as the logic gates require and so the signals will have to be converted to this level using a comparator circuit as shown in Figure VII. Note that you can use the threshold control for all the segments you are reading and, in an LM399 IC, there are four identical comparators.

This simple form of driving a display requires a lot of connections, seven for each digit plus one for the backplane.

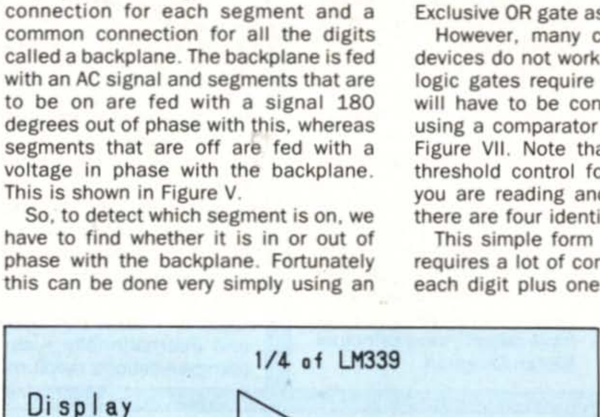


Figure VII: Circuit for converting display voltage to logic levels

We could express this with the formula:

```
Number of connections= 7*N+1
```

Where N is the number of digits on the display. You can see that as N gets larger so does the number of connections used.

The major factor in determining the cost of manufacture for any electronic device is not its complexity but how many connections it possesses. So a different way of driving the seven segments has been devised known as the triplex system and this is the one you are most likely to come across.

It uses three backplane or common lines and three lines per digit, therefore the total number of lines needed to drive a triplex display is:

```
Number of connections= 3*N+3
```

As you can see this very quickly saves a lot of cost over the conventional system. This is bad news for us, however, as it requires much more complex waveforms to drive it.

Figure VIII shows the arrangement of a typical triplex display. The common lines on the back of the display (C1 - C3) match up with the three signal lines (X, Y, Z) on the front to form the segments.

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MicroLink
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NEWSLETTER

USA link back in action

THE giant American database Mnematics is once again available to MicroLink subscribers after a complete reorganisation.

Mnematics' switch to a more efficient system carrier caused the temporary severance of UK links with the dynamic electronic information source.

But now MicroLink subscribers can again chat to enthusiasts in the USA and tap the vast array of computer-related and special interest group sections.

All the old Mnematics features are back – plus some new departments – and there are plans for even closer ties with MicroLink.

These include a reverse gateway to allow the Americans to make direct calls to MicroLink and see what's on offer over here.

Farming baronet on line

DOWN on the farm or in the factory, baronet and MicroLink subscriber Sir Charles Legard is equally at home thanks to computer communications.

Information technology makes sure he's always up to date with what's happening on his North Yorkshire estates in the Vale of Pickering as well as the family businesses in Leeds and Bradford.

Sir Charles farms 1,700 acres of arable land around Scampston Hall, Malton, in addition to running companies involved in engineering and wholesaling electrical components.

Legards have owned land in Yorkshire since the 12th Century, but the micro and modem are now as much a part of the scene at Scampston Hall as the family portraits.

"Whether I'm at home or in one of my offices, computer communications keep me constantly in touch with what's going on elsewhere", said Sir Charles.

Communicating to cut unemployment

TWO organisations at opposite ends of the spectrum are using MicroLink communications as they attempt to reduce unemployment.

Camden Jobtrain in North London provides local youngsters with opportunities to learn the specific skills which surveys have revealed are most wanted by employers in the area.

There are 120 places on courses in motor mechanics, carpentry and joinery, office skills, catering, and care for the elderly and young children – all leading to City and Guilds or other qualifications.

At the other end of the scale, the Mid-Career Development Centre in Croydon helps business and professional people who have been made redundant or want a more fulfilling job.

The Centre's experienced career counsellors provide individual help to restore confidence and practical assistance in getting a new job.

"Many people find that being made redundant turned out to be a lucky break because it galvanised them into action they might otherwise never have taken", says principal Kieran Duignan.

A new line for the Church

COMPUTER communications systems like MicroLink have become a major focus of interest for Britain's churches.

A joint study of information technology is currently being undertaken by Church House, the Anglican Consultative Council and the British Council of Churches. It will eventually lead to more efficient electronic communication between churches all over the world.

Meanwhile similar assessments on a smaller scale are being conducted in just about every diocese in the UK. Typical of these is the one being done by the Rev Richard Thomas, communications officer for the Diocese of Winchester.

"I'm using MicroLink as part of my brief to explore the whole area of communications", he said.

"I believe electronic mail is going to become very important and I'm sure it has a lot to offer the Church – both nationally and internationally – as a communications medium".

Your chance to join MicroLink – turn to Page 71

BR BOOKING EASIER

MICROLINK's convenient British Rail telebooking service has been given a complete update.

It allows subscribers at any hour of the day or night to order train tickets for journeys between London and more than 20 major UK centres from Aberdeen to York.

Subscribers can book their journeys via MicroLink after studying the electronic timetables in the comfort of their own home or office, and charge them to their Access, Barclaycard, American Express or Travel Key account. Tickets are sent by return post.

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These can be thought of as forming a capacitor to produce the polarising segments.

You can see that segment f is formed between signal lines C1 and X. In order to turn this segment on and not any others connected with these lines we need some very fancy waveforms.

These are shown in Figure IX but don't give up – they are understandable with a little effort.

The first thing you will notice about these waveforms is that they are no longer conventional logic signals that have two levels but instead they have four different levels which are equally spaced between the supply voltage (V+) and a display level (Vdis).

The latter voltage controls the contrast and to some extent the viewing angle. A control is usually available to alter this. The solid line in the centre is drawn to show the symmetry of the waveform and show the display's virtual earth point.

The top three waveforms are the three common signals and the bottom four are the possible states of any of the X, Y or Z lines depending upon which segments are being turned on. The signal showing one segment on is shifted in phase by one clock cycle depending which segment it is. Similarly the signal for two segments on will change phase depending upon which two are being used.

So how can we possibly make sense of all this? Well, remember that a segment is on when it has an AC electric field across it so what we are really interested in is not the signal on any line but the signal across each segment. If this is small then the segment is off (or weakly polarised) and if it is large then the segment is on (or strongly polarised).

So in order to see the voltage across any one segment we have to look at the difference between the appropriate common line and the display line. I have done this in Figure X for the C1 and Y lines.

Remember from Figure VIII that the C1 line is connected to segments a, f and b and the Y line to segments a, g and d. Therefore, between them, lines C1 and Y control the a segment.

So Figure X shows the various voltage waveforms across the a segment for all possible states of the a, g and d segments. If you would like to construct this for yourself try superimposing a waveform on the C1 waveform.

Now, using C1 as the reference, how

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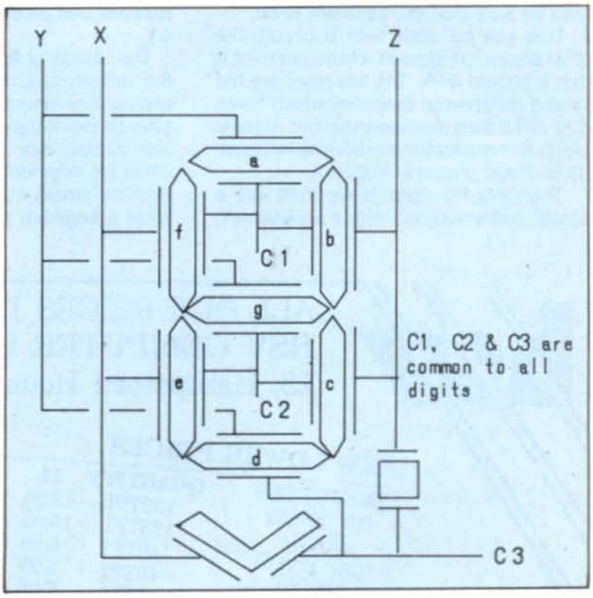

Figure VIII: A triplex seven segment display

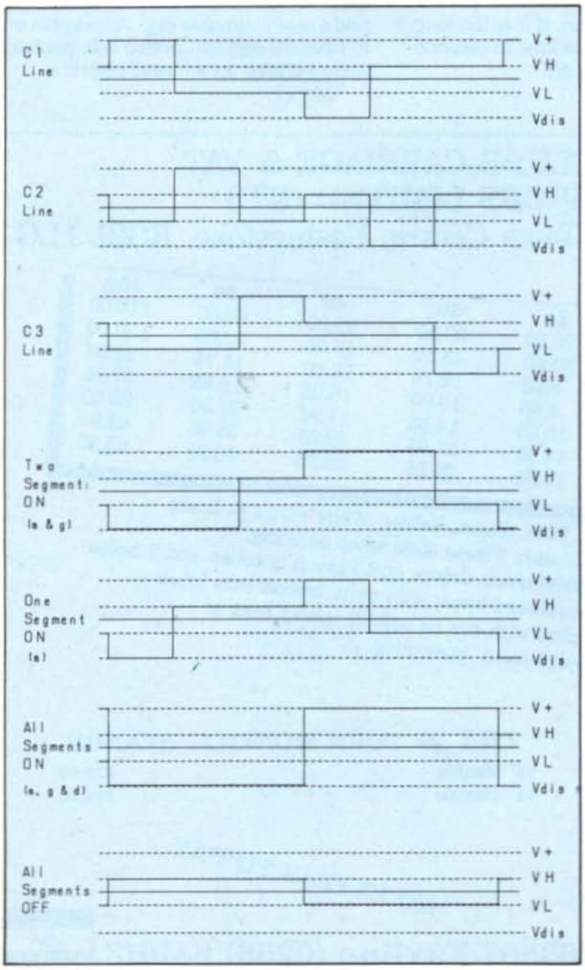

Figure IX: Driving waveforms for triplex LCD display

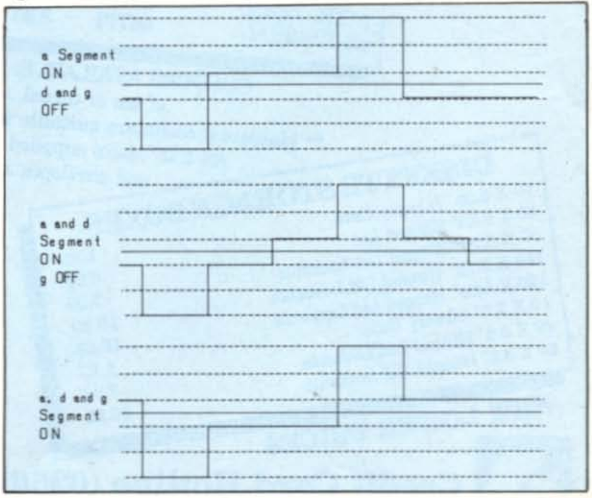

Figure X: Possible voltage waveforms across segment a

◄ *From Page 107*

many divisions up or down do you need to get to the Y signal level? Plot that number on a separate graph and you will get the waveforms shown in Figure X. You can even repeat the exercise for the C2 and C3 lines and other segments, you will find that the waveforms are all similar.

If we look at Figure X we should see a characteristic that will help us identify if the segment is on. Whenever a segment is on, the waveform peaks far higher than when it is off. This happens irrespective of the state of the other segments connected to the lines.

So what we need, in order to tap into a triplex display segment, is to monitor the difference between a common line and a signal line. When this difference becomes greater than a certain value we can be sure that the segment is on.

This can be done with a circuit like that shown in Figure XI, I have not tried it but it should work. The two lines are fed into a differential amplifier which takes the difference between the two signals and so converts the waveforms in Figure IX to those shown in Figure X.

Then this AC signal is rectified with a diode and smoothed with a resistor and capacitor. This produces a DC signal proportional to the peak height of the difference waveform. It is detected with a comparator to see if the signal exceeds that produced with the segment on.

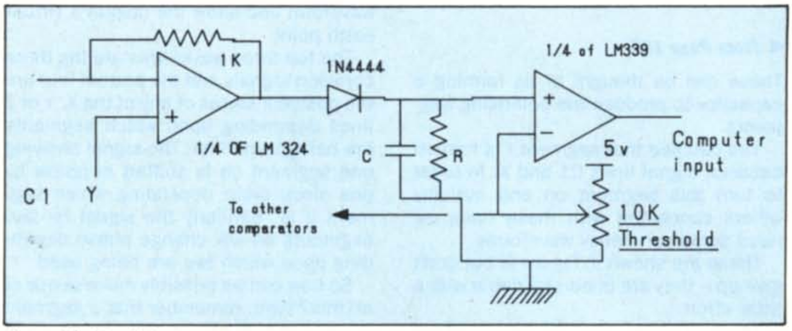

Figure XI: Circuit to recover one segment from a triplex display

The values of R and C will depend on the refresh rate of the display and you should experiment for best results. If the time constant they form is too short then the comparator will produce pulses when the segment is on. If it is too long then the circuit will take time to respond when a segment goes off.

Just to complicate matters there is another way of driving liquid crystal displays using a four signal multiplex but that is normally reserved for large area dot matrix displays and is even more complicated.

Unravelling the signals driving a liquid crystal display is like trying to unscramble an egg. It can be done but I will leave it to you to whether it is really worth it. You never know when you might find a really valuable egg. Anyway I'm off to have my egg soft boiled with soldiers while I dream up the next project.

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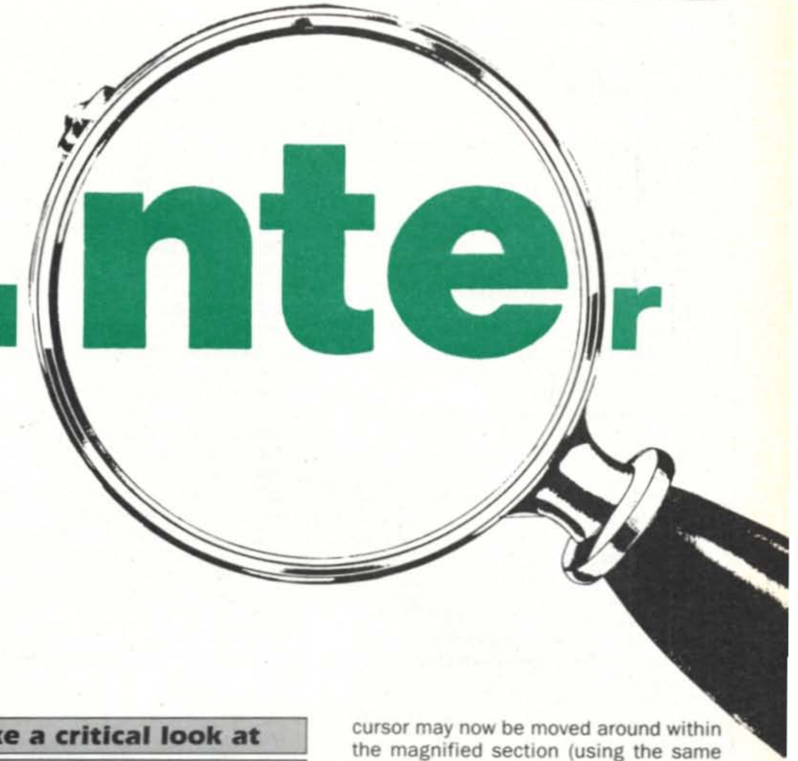

Take a critical look at your screen with Rob Anderson's Pixel Editor

USING a screen design package like MicroWorks (from the October issue of *The Micro User*) is very good for broad screen work. But sometimes you need to be able to edit the close-up detail of your screens.

Such precision work is best accomplished with a pixel editor, which magnifies a section of the screen and allows individual screen pixels to be easily changed.

This program may be used on its own with its simple but effective front end that enables a screen to be loaded/saved directly, or in conjunction with a complete screen design package.

It enables any area of a graphics mode screen to be magnified by a factor of three while facilitating easy editing of the pixels being displayed. It is compatible with all versions of the BBC Micro (except Archimedes) but will not work over the Tube due to direct screen addressing.

First type in and save the program Source, then use the checksums to correct any of your typing errors. When run the program creates two machine code routines, *Object1* and *Object2*, which are used by the main program to transfer data to and from the screen buffer in the various screen modes.

Now type in the main Basic program, Pixel, and save it – again ensuring you've made no errors.

Once the files have been entered and saved, the system can be run by typing the following:

```
PAGE=&1D00
CHAIN"PIXEL"
```

Note that PAGE, the place in memory where the Basic program is to reside, is set higher than usual due to the workspace that the program requires.

You are first prompted for the screen mode that you want to use, after which a title screen is displayed showing what keys are required to operate the pixel editor. The program then asks for the filename of the screen to be edited.

At this point you can also issue operating system commands using * followed by the command. Finally, a destination filename is required which is what the screen will be saved as when editing has been completed.

Once the screen has been loaded, a square cursor appears (the magnifying cursor), which may be moved around using either the cursor keys or Z, X, : and /. Double speed movement can be achieved by simultaneously holding down the Shift key.

The area contained in this square is magnified and displayed in one of two corners of the screen. Note that as soon as the cursor goes near the corner that's being used for the display it immediately flips to the opposite corner enabling the whole screen to be examined.

To change any of the individual pixels, simply move the magnifying cursor over the desired area and press Tab. A small cursor may now be moved around within the magnified section (using the same keys as before), during which any pixel may be changed by pressing the logical number of the colour desired. For example, pressing 2 in Mode 1 gives yellow, while pressing F (hexadecimal) in mode 2 gives flashing White/Black.

If a number of pixels need changing, the Shift key can be held down while moving the edit cursor, which will result in the last selected colour being placed wherever the edit cursor goes. Any changes are immediately reflected on the main screen.

By pressing Tab again, control goes back to the magnifying cursor, so that other areas of the screen can be examined. Once all the changes have been made, pressing Escape saves the screen using the second filename that was input at the start.

And there you have it – a versatile pixel editor which is the perfect complement to any screen design package.

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MAIN PROCEDURES

wait	Prevents Tab key bounce
frontend	Sets up the program
initial	Loads files and sets variables
error	Reports any errors except Escape
box(x%,y%,m%)	Draws the magnifying cursor and image
quad(m%)	Draws quadrant surround and moves memory
finished	Removes all cursors and saves the screen

◄ *From Page 109*

Program I

```
   10 REM Source
   20 REM by Rob Anderson
   30 REM (c) The Micro User
   40 codestart%=&900
   50 bufferpos%=&1100
   60 PROCass1:PROCoutputinfo("1")
   70 PROCass2:PROCoutputinfo("2")
   80 END
   90 DEFPROCoutputinfo(I$)
  100 PRINT"OBJECT";I$;" compiled :"
  110 PROCcli("SAVE OBJECT"+I$+" "+STR$~
codestart%+" "+STR$~P%)
  120 PRINT"MemToScreen = &";~MemToScre
en
  130 PRINT"ScreenToMem = &";~ScreenToMe
m
  140 PRINT"Magnify = &";~Magnify
  150 ENDPROC
  160 DEFPROCass1
  170 REM FOR MODES 0, 1, 2
  180 FORpass%=0TO2 STEP 2
  190 P%=codestart%
  200 [OPTpass%
  210 \ subroutine to dump the memory bu
ffer back to the screen (reinstating the
 background)
  220 .MemToScreen
  230 LDY#0:LDA#(bufferpos%MOD256):STA&8
2:LDA#(bufferpos%DIV256):STA&83
  240 .loop1
  250 LDA(&82),Y:STA(&80),Y
  260 INY:BNE loop1
  270 LDY#0:LDA&80:CLC:ADC#&80:STA&80:LD
A&81:ADC#2:STA&81:INC&83:
  280 LDA&83:CMP#(bufferpos%DIV256)+&C:B
NEloop1
  290 RTS
  300 \ subroutine to dump the part of t
he screen about to be covered by a quadr
ant to the buffer
  310 .ScreenToMem
  320 LDY#0:LDA#(bufferpos%MOD256):STA&8
2:LDA#(bufferpos%DIV256):STA&83
  330 LDA&80:PHA:LDA&81:PHA
  340 .loop2
  350 LDA(&80),Y:STA(&82),Y
  360 INY:BNE loop2
  370 LDY#0:LDA&80:CLC:ADC#&80:STA&80:LD
A&81:ADC#2:STA&81:INC&83
  380 LDA&83:CMP#(bufferpos%DIV256)+&C:B
NEloop2
  390 PLA:STA&81:PLA:STA&80
  400 JSR Magnify
  410 RTS
  420 .Magnify
  430 LDA&80:PHA:LDA&81:PHA
  440 LDA#0:STA&88:STA&89:STA&8A
  450 .mainmagloop
  460 LDY#0:LDX#0
  470 .magloop
  480 STY&87:LDY#0:LDA(&84),Y:STA&86:LDY
&87
  490 \ find out which mode, and decode
pixels accordingly
  500 LDA&8B:BEQinmode0:JMPmode1or2
  510 .inmode0
  520 \In mode 0
  530 \pixel 1 & 2
  540 LDA&86:AND#192
  550 BEQblack1:CMP#64:BEQrwht1:CMP#128:
BEQlwht1:LDA#238:JMPend0pix1
  560 .black1:LDA#0:JMPend0pix1
  570 .rwht1:LDA#14:JMPend0pix1
  580 .lwht1:LDA#224
  590 .end0pix1:JSRprintpix
  600 \pixel 3 & 4
  610 LDA&86:AND#48
  620 BEQblack2:CMP#16:BEQrwht2:CMP#32:B
EQlwht2:LDA#238:JMPend0pix2
  630 .black2:LDA#0:JMPend0pix2
  640 .rwht2:LDA#14:JMPend0pix2
  650 .lwht2:LDA#224
  660 .end0pix2:JSRprintpix
  670 \pixel 5 & 6
  680 LDA&86:AND#12
  690 BEQblack3:CMP#4:BEQrwht3:CMP#8:BEQ
lwht3:LDA#238:JMPend0pix3
  700 .black3:LDA#0:JMPend0pix3
  710 .rwht3:LDA#14:JMPend0pix3
  720 .lwht3:LDA#224
  730 .end0pix3:JSRprintpix
  740 \pixel 7 & 8
  750 LDA&86:AND#3
  760 BEQblack4:CMP#1:BEQrwht4:CMP#2:BEQ
lwht4:LDA#238:JMPend0pix4
  770 .black4:LDA#0:JMPend0pix4
  780 .rwht4:LDA#14:JMPend0pix4
  790 .lwht4:LDA#224
  800 .end0pix4:JSRprintpix
  810 JMPcontinue
  820 .mode1or2
  830 CMP#1:BEQismode1:JMPismode2
  840 .ismode1
  850 \ In mode 1
  860 \pixel 1
  870 LDA&86:AND#136
  880 BNEchkwht1:LDA#0:JMPend1pix1
  890 .chkwht1:CMP#136:BNEchkyel1:LDA#23
8:JMPend1pix1
  900 .chkyel1:CMP#128:BNEisred1:LDA#224
:JMPend1pix1
  910 .isred1:LDA#14
  920 .end1pix1:JSRprintpix
  930 \pixel 2
  940 LDA&86:AND#68
  950 BNEchkwht2:LDA#0:JMPend1pix2
  960 .chkwht2:CMP#68:BNEchkyel2:LDA#238
:JMPend1pix2
  970 .chkyel2:CMP#64:BNEisred2:LDA#224:
JMPend1pix2
  980 .isred2:LDA#14
  990 .end1pix2:JSRprintpix
 1000 \pixel 3
 1010 LDA&86:AND#34
 1020 BNEchkwht3:LDA#0:JMPend1pix3
 1030 .chkwht3:CMP#34:BNEchkyel3:LDA#238
:JMPend1pix3
 1040 .chkyel3:CMP#32:BNEisred3:LDA#224:
JMPend1pix3
 1050 .isred3:LDA#14
 1060 .end1pix3:JSRprintpix
 1070 \pixel 4
 1080 LDA&86:AND#17
 1090 BNEchkwht4:LDA#0:JMPend1pix4
 1100 .chkwht4:CMP#17:BNEchkyel4:LDA#238
:JMPend1pix4
 1110 .chkyel4:CMP#16:BNEisred4:LDA#224:
JMPend1pix4
 1120 .isred4:LDA#14
 1130 .end1pix4:JSRprintpix
 1140 JMPcontinue
 1150 .ismode2
 1160 \ is mode 2
 1170 \pixel 1
 1180 LDA&86:PHA:AND#170:STA&86:LSR A:OR
A &86:STA&86:JSRprintpix:LDA&86:AND#170:
JSRprintpix:PLA:STA&86
 1190 \pixel 2
 1200 LDA&86:PHA:AND#85:STA&86:ASL A:ORA
 &86:STA&86:JSRprintpix:LDA&86:AND#170:J
SRprintpix:PLA:STA&86
 1210 .continue
 1220 LDA&84:CLC:ADC#8:STA&84:LDA&85:ADC
#0:STA&85:INX:CPX#8:BEQoutmag:JMPmagloop
:.outmag
 1230 LDA&84:SEC:SBC#64:STA&84:LDA&85:SB
C#0:STA&85
 1240 LDA&84:CLC:ADC#1:STA&84:LDA&85:ADC
#0:STA&85:INC&8A:LDA&8A:CMP#8:BNEcont:LD
A&84:CLC:ADC#&78:STA&84:LDA&85:ADC#2:STA
&85:LDA#0:STA&8A:.cont
 1250 LDA&88:BEQincby4
 1260 LDA&80:CLC:ADC#&7C:STA&80:LDA&81:A
DC#2:STA&81:LDA#0:STA&88:JMPfinal
 1270 .incby4:LDA&80:CLC:ADC#4:STA&80:LD
A&81:ADC#0:STA&81:LDA#1:STA&88
 1280 .final
 1290 INC&89:LDA&89:CMP#24:BEQmagout:JMP
mainmagloop
 1300 .magout
 1310 PLA:STA&81:PLA:STA&80
 1320 RTS
 1330 \ Subroutine to output the magnifi
ed pixel held in A to the screen
 1340 .printpix
 1350 STA(&80),Y:INY:STA(&80),Y:INY:STA(
&80),Y:INY:LDA#0:STA(&80),Y:TYA:CLC:ADC#
5:TAY
 1360 RTS
 1370 ]
 1380 NEXT
 1390 ENDPROC
 1400 DEFPROCass2
 1410 REM FOR MODES 4 AND 5
 1420 FORpass%=0TO2 STEP 2
 1430 P%=codestart%
 1440 [OPTpass%
 1450 \ subroutine to dump the memory bu
ffer back to the screen (reinstating the
 background)
 1460 .MemToScreen
 1470 LDY#0:LDA#(bufferpos%MOD256):STA&8
2:LDA#(bufferpos%DIV256):STA&83
 1480 .loop1
 1490 LDA(&82),Y:STA(&80),Y
 1500 INY:CPY#128:BNE loop1
 1510 LDY#0:LDA&80:CLC:ADC#64:STA&80:LDA
&81:ADC#1:STA&81:INC&83
 1520 LDA&83:CMP#(bufferpos%DIV256)+&C:B
NEloop1
 1530 RTS
 1540 \ subroutine to dump the part of t
he screen about to be covered by a quadr
ant to the buffer
 1550 .ScreenToMem
 1560 LDY#0:LDA#(bufferpos%MOD256):STA&8
2:LDA#(bufferpos%DIV256):STA&83
 1570 LDA&80:PHA:LDA&81:PHA
 1580 .loop2
 1590 LDA(&80),Y:STA(&82),Y
 1600 INY:CPY#128:BNE loop2
 1610 LDY#0:LDA&80:CLC:ADC#64:STA&80:LDA
&81:ADC#1:STA&81:INC&83
 1620 LDA&83:CMP#(bufferpos%DIV256)+&C:B
NEloop2
 1630 PLA:STA&81:PLA:STA&80
 1640 JSR Magnify
 1650 RTS
 1660 .Magnify
 1670 LDA&80:PHA:LDA&81:PHA
 1680 LDA#0:STA&88:STA&89:STA&8A
 1690 .mainmagloop
 1700 LDY#0:LDX#0
 1710 .magloop
```

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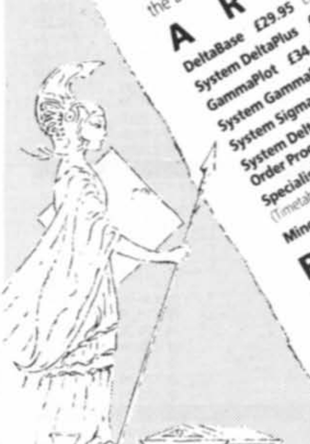

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```
 1720 STY&87:LDY#0:LDA(&84),Y:STA&86:LDY
&87
 1730 \ find out which mode, and decode
pixels accordingly
 1740 LDA&8B:CMP#4:BEQmode4:JMPmode5
 1750 .mode4
 1760 \pixel 1 & 2
 1770 LDA&86:AND#192
 1780 BEQblack1:CMP#64:BEQrwht1:CMP#128:
BEQlwht1:LDA#238:JMPend4pix1
 1790 .black1:LDA#0:JMPend4pix1
 1800 .rwht1:LDA#14:JMPend4pix1
 1810 .lwht1:LDA#224
 1820 .end4pix1:JSRprintpix
 1830 \pixel 3 & 4
 1840 LDA&86:AND#48
 1850 BEQblack2:CMP#16:BEQrwht2:CMP#32:B
EQlwht2:LDA#238:JMPend4pix2
 1860 .black2:LDA#0:JMPend4pix2
 1870 .rwht2:LDA#14:JMPend4pix2
 1880 .lwht2:LDA#224
 1890 .end4pix2:JSRprintpix
 1900 \pixel 5 & 6
 1910 LDA&86:AND#12
 1920 BEQblack3:CMP#4:BEQrwht3:CMP#8:BEQ
lwht3:LDA#238:JMPend4pix3
 1930 .black3:LDA#0:JMPend4pix3
 1940 .rwht3:LDA#14:JMPend4pix3
 1950 .lwht3:LDA#224
 1960 .end4pix3:JSRprintpix
 1970 \pixel 7 & 8
 1980 LDA&86:AND#3
 1990 BEQblack4:CMP#1:BEQrwht4:CMP#2:BEQ
lwht4:LDA#238:JMPend4pix4
 2000 .black4:LDA#0:JMPend4pix4
 2010 .rwht4:LDA#14:JMPend4pix4
 2020 .lwht4:LDA#224
 2030 .end4pix4:JSRprintpix
 2040 JMPcontinue
 2050 .mode5
 2060 \ In mode 5
 2070 \pixel 1
 2080 LDA&86:AND#136
 2090 BNEchkwht1:LDA#0:JMPend5pix1
 2100 .chkwht1:CMP#136:BNEchkyel1:LDA#23
8:JMPend5pix1
 2110 .chkyel1:CMP#128:BNEisred1:LDA#224
:JMPend5pix1
 2120 .isred1:LDA#14
 2130 .end5pix1:JSRprintpix
 2140 \pixel 2
 2150 LDA&86:AND#68
 2160 BNEchkwht2:LDA#0:JMPend5pix2
 2170 .chkwht2:CMP#68:BNEchkyel2:LDA#238
:JMPend5pix2
 2180 .chkyel2:CMP#64:BNEisred2:LDA#224:
JMPend5pix2
 2190 .isred2:LDA#14
 2200 .end5pix2:JSRprintpix
 2210 \pixel 3
 2220 LDA&86:AND#34
 2230 BNEchkwht3:LDA#0:JMPend5pix3
 2240 .chkwht3:CMP#34:BNEchkyel3:LDA#238
:JMPend5pix3
 2250 .chkyel3:CMP#32:BNEisred3:LDA#224:
JMPend5pix3
 2260 .isred3:LDA#14
 2270 .end5pix3:JSRprintpix
 2280 \pixil 4
 2290 LDA&86:AND#17
 2300 BNEchkwht4:LDA#0:JMPend5pix4
 2310 .chkwht4:CMP#17:BNEchkyel4:LDA#238
:JMPend5pix4
 2320 .chkyel4:CMP#16:BNEisred4:LDA#224:
JMPend5pix4
 2330 .isred4:LDA#14
 2340 .end5pix4:JSRprintpix
 2350 .continue
 2360 LDA&84:CLC:ADC#8:STA&84:LDA&85:ADC
#0:STA&85:INX:CPX#4:BEQoutmag:JMPmagloop
:.outmag
 2370 LDA&84:SEC:SBC#32:STA&84:LDA&85:SB
C#0:STA&85
 2380 LDA&84:CLC:ADC#1:STA&84:LDA&85:ADC
#0:STA&85:INC&8A:LDA&8A:CMP#8:BNEcont:LD
A&84:CLC:ADC#56:STA&84:LDA&85:ADC#1:STA&
85:LDA#0:STA&8A:.cont
 2390 LDA&88:BEQincby4
 2400 LDA&80:CLC:ADC#60:STA&80:LDA&81:AD
C#1:STA&81:LDA#0:STA&88:JMPfinal
 2410 .incby4:LDA&80:CLC:ADC#4:STA&80:LD
A&81:ADC#0:STA&81:LDA#1:STA&88
 2420 .final
 2430 INC&89:LDA&89:CMP#24:BEQmagout:JMP
mainmagloop
 2440 .magout
 2450 PLA:STA&81:PLA:STA&80
 2460 RTS
 2470 \ Subroutine to output the magnifi
ed pixel held in A to the screen
 2480 .printpix
 2490 STA(&80),Y:INY:STA(&80),Y:INY:STA(
&80),Y:INY:LDA#0:STA(&80),Y:TYA:CLC:ADC#
5:TAY
 2500 RTS
 2510 ]:NEXT:ENDPROC
```

✓ Get it right!

```
  10 =    0 0 |  430 = BE37 3 |  850 =    0 D
  20 =    0 0 |  440 = 2D81 9 |  860 =    0 D
  30 =    0 0 |  450 = 4F82 8 |  870 = 4D21 9
  40 = 4D1E E |  460 = 4971 A |  880 =  D69 D
  50 = 4A00 F |  470 = 1CE0 B |  890 = B508 0
  60 = 27BD D |  480 = C821 0 |  900 = F317 1
  70 = 7E9F 8 |  490 =    0 0 |  910 = E67D 2
  80 = FD2E 3 |  500 = 8B23 5 |  920 = A9C0 7
  90 = DFB7 1 |  510 = 92A9 6 |  930 =    0 7
 100 = 9119 F |  520 =    0 6 |  940 = 1FA1 A
 110 = 3F75 6 |  530 =    0 6 |  950 = 4F0A C
 120 =  5D2 3 |  540 = E26E 2 |  960 = 42B1 2
 130 = 6EC7 B |  550 = 1BEF D |  970 =  C66 F
 140 = 212B E |  560 = C507 6 |  980 = 2E08 E
 150 = ED0F E |  570 = C80C 7 |  990 = 6665 A
 160 = 4464 B |  580 = 341B 8 | 1000 =    0 A
 170 =    0 B |  590 = B922 E | 1010 = 21D8 8
 180 = 82D6 6 |  600 =    0 E | 1020 = 8134 9
 190 = 1CCB 3 |  610 = 79C3 F | 1030 = A469 F
 200 = 2159 1 |  620 = C33E 7 | 1040 = 15C0 3
 210 =    0 1 |  630 = 8764 A | 1050 = 69DB D
 220 = 2CA3 5 |  640 = A6BA 3 | 1060 = 2306 9
 230 = D3E6 0 |  650 = 195F A | 1070 =    0 9
 240 = 3311 8 |  660 = 7687 5 | 1080 = 77D9 3
 250 = D7AE C |  670 =    0 5 | 1090 = CBCC 1
 260 = 6DCC E |  680 = 277C 5 | 1100 = CC0B 7
 270 = 31E3 7 |  690 = 383C 6 | 1110 = 594E 6
 280 = 491B 1 |  700 = 495A 6 | 1120 = AEC3 F
 290 = 9843 A |  710 = 8328 E | 1130 = E90E 0
 300 =    0 A |  720 = F27C 2 | 1140 = 668B 5
 310 = 5760 7 |  730 = 33E4 1 | 1150 = E62C 8
 320 = D3E6 A |  740 =    0 1 | 1160 =    0 8
 330 = BE37 1 |  750 = E1BA 3 | 1170 =    0 8
 340 =  372 B |  760 = BCEE 6 | 1180 = BF61 4
 350 = 771F 3 |  770 =  3A2 A | 1190 =    0 4
 360 = 5DAF 3 |  780 = 7BD6 A | 1200 = 3E8F 4
 370 = B111 F |  790 = 43D7 B | 1210 =  2EE E
 380 = 7978 C |  800 = F9EC E | 1220 = 4737 B
 390 =  4D7 D |  810 = 668B E | 1230 = 62D1 0
 400 = 4395 A |  820 = C0BB B | 1240 = 6B44 9
 410 = 9843 4 |  830 = 25AE 7 | 1250 = 3F69 4
 420 =  66F A |  840 = D64F D | 1260 = 37F1 1
```

```
1270 = F241 4 | 1690 = 4F82 9 | 2110 = 7A11 5
1280 = DE0C D | 1700 = 4971 C | 2120 = E67D 0
1290 = 2FB8 6 | 1710 = 1CE0 7 | 2130 = EA48 D
1300 = 88B2 A | 1720 = C821 B | 2140 =    0 D
1310 =  4D7 6 | 1730 =    0 B | 2150 = 1FA1 D
1320 = 9843 C | 1740 = D992 E | 2160 = C60C 8
1330 =    0 C | 1750 = C592 C | 2170 = CBB7 C
1340 = 5F2A 0 | 1760 =    0 C | 2180 = 8560 A
1350 = 5027 D | 1770 = E26E E | 2190 = 2E08 0
1360 = 9843 7 | 1780 = 92E9 D | 2200 = 25ED B
1370 = 8B58 1 | 1790 = 4C01 D | 2210 =    0 B
1380 = 2C83 B | 1800 = 410A D | 2220 = 21D8 F
1390 = ED0F 1 | 1810 = 341B D | 2230 =  832 E
1400 = 7407 D | 1820 = FAAA E | 2240 = 2D6F 3
1410 =    0 D | 1830 =    0 E | 2250 = 9CC6 F
1420 = 82D6 3 | 1840 = 79C3 6 | 2260 = 69DB 7
1430 = 1CCB E | 1850 = 4A38 0 | 2270 = 608E F
1440 = 2159 5 | 1860 =  E62 0 | 2280 =    0 F
1450 =    0 5 | 1870 = 2FBC 5 | 2290 = 77D9 6
1460 = 2CA3 9 | 1880 = 195F 9 | 2300 = 42CA 0
1470 = D3E6 B | 1890 = 350F 3 | 2310 = 450D E
1480 = 3311 1 | 1900 =    0 3 | 2320 = D048 2
1490 = D7AE 9 | 1910 = 277C F | 2330 = AEC3 5
1500 = BD6A C | 1920 = B13A C | 2340 = AA86 A
1510 = 1797 B | 1930 = C05C B | 2350 =  2EE E
1520 = 491B 7 | 1940 =  A2E 4 | 2360 = 2BB3 3
1530 = 9843 9 | 1950 = F27C 5 | 2370 = BAB4 0
1540 =    0 9 | 1960 = 706C 8 | 2380 = E26C 6
1550 = 5760 A | 1970 =    0 8 | 2390 = 3F69 3
1560 = D3E6 0 | 1980 = E1BA A | 2400 = 70B1 B
1570 = BE37 2 | 1990 = 35E8 B | 2410 = F241 9
1580 =  372 6 | 2000 = 8AA4 B | 2420 = DE0C 4
1590 = 771F 8 | 2010 = F2D0 2 | 2430 = 2FB8 4
1600 = 8D09 2 | 2020 = 43D7 2 | 2440 = 88B2 7
1610 = 1797 3 | 2030 = BA64 0 | 2450 =  4D7 8
1620 = 7978 8 | 2040 = 668B 5 | 2460 = 9843 E
1630 =  4D7 9 | 2050 = D5B3 D | 2470 =    0 E
1640 = 4395 6 | 2060 =    0 D | 2480 = 5F2A 1
1650 = 9843 F | 2070 =    0 D | 2490 = 5027 6
1660 =  66F 2 | 2080 = 4D21 1 | 2500 = 9843 B
1670 = BE37 B | 2090 = 846F 8 | 2510 = 953B 5
1680 = 2D81 5 | 2100 = 3C0E C |
```

Program II

```
   10 REM PIXEL EDITOR
   20 REM by Rob Anderson
   30 REM (c) The Micro User
   40 HIMEM=&3000
   50 *FX200,1
   60 ONERRORPROCerror
   70 PROCfrontend
   80 PROCinitial
   90 VDU5:PROCquad(2):PROCbox(x%,y%,1)
  100 REPEAT
  110 REPEAT
  120 IFFNescape escape%=TRUE
  130 fl%=FALSE:ox%=x%:oy%=y%
  140 IFFNshift xstep%=64:ystep%=64ELSEx
step%=magstep%:ystep%=32
  150 IFFNleft x%=x%-xstep%:fl%=TRUE
  160 IFFNright x%=x%+xstep%:fl%=TRUE
  170 IFFNup y%=y%+ystep%:fl%=TRUE
  180 IFFNdown y%=y%-ystep%:fl%=TRUE
  190 IFx%<-4 x%=-4ELSEIFx%>1148 x%=1148
  200 IFy%<96 y%=96 ELSEIFy%>1024y%=1024
  210 IF x%>628ANDy%<486ANDquad%=2 PROCq
uad(1):quad%=1:PROCquad(2)
  220 IF x%<516ANDy%>632ANDquad%=1 PROCq
uad(1):quad%=2:PROCquad(2)
```

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◀ *From Page 113*

```
  230 IFfl%PROCbox(ox%,oy%,2):PROCbox(x%
,y%,1):fl%=FALSE
  240 UNTILFNtab ORescape%
  250 IFescape% PROCfinish:MODE7:END
  260 IFquad%=1 orgx%=-8:orgy%=660 ELSE
orgx%=760:orgy%=20
  270 plot%=FALSE:col%=0:xq%=orgx%:yq%=o
rgy%:MOVExq%,yq%:PRINTCHR$128;
  280 *FX15,0
  290 PROCwait
  300 REPEAT
  310 IFFNescape escape%=TRUE
  320 fl%=FALSE:ox%=xq%:oy%=yq%
  330 IFFNleft xq%=xq%-editstep%:fl%=TRU
E
  340 IFFNright xq%=xq%+editstep%:fl%=TR
UE
  350 IFFNup yq%=yq%+16:fl%=TRUE
  360 IFFNdown yq%=yq%-16:fl%=TRUE
  370 temp%=FNgetcolour:IFtemp%<>-1 col%
=temp%:plot%=TRUE:fl%=TRUE
  380 IFFNshift plot%=TRUE
  390 IF(xq%-orgx%)<0 xq%=orgx% ELSEIF(x
q%-orgx%+editstep%)>512 xq%=(orgx%+512-e
ditstep%)
  400 IF(yq%-orgy%)<0 yq%=orgy% ELSEIF (
yq%-orgy%)>368 yq%=(orgy%+368)
  410 IF plot% GCOL0,col%:MOVExq%,yq%:PR
INT;CHR$129;:PLOT69,(x%+4+(xq%-orgx%)/4)
,(y%-96+(yq%-orgy%)/4)
  420 GCOL3,white%:IFfl%MOVEox%,oy%:PRIN
T;CHR$128;:MOVExq%,yq%:PRINT;CHR$128;
  430 plot%=FALSE
  440 UNTILFNtab ORescape%
  450 MOVExq%,yq%:PRINT;CHR$128;:*FX15,0
  460 IFescape% PROCfinish:MODE7:END
  470 PROCwait
  480 UNTILFALSE
  490 END
  500 DEFPROCwait
  510 a%=TIME:REPEAT:UNTILTIME=a%+50
  520 ENDPROC
  530 DEFPROCfrontend
  540 VDU22,7
  550 FORA=1TO2:PRINTTAB(11,A)CHR$141;CH
R$131;"Pixel Editor":NEXT:PRINTCHR$134"V
ersion 1.4 - for any graphics mode"
  560 VDU28,0,24,39,3
  570 PRINT''CHR$134"Which mode (0,1,2,4
 or 5) ?"
  580 REPEAT
  590 mode%=GET-48
  600 UNTILmode%>=0ANDmode%<6ANDmode%<>3
  610 CLS:PRINTTAB(8)CHR$134"Version 1.4
 - mode ";mode%
  620 PRINTTAB(0,2)CHR$131"Z"CHR$134"]le
ft"TAB(10)CHR$131"X"CHR$134"]right"TAB(2
0)CHR$131":"CHR$134"]up"TAB(30)CHR$131"/
"CHR$134"]down"TAB(10)CHR$131"(or cursor
 keys)"
  630 PRINTCHR$131"TAB"CHR$134"]toggle m
agnify / edit mode."
  640 PRINTCHR$131"SHIFT"CHR$134"]double
 speed / last colour."
  650 PRINTCHR$131"HEX characters"CHR$13
4"]select colour."
  660 VDU26;28,0,24,39,10
  670 REPEAT
  680 REPEAT
  690 PRINT'CHR$131"Enter filename to be
 edited (or *<OS>)"
  700 INPUTfile$
  710 UNTILfile$<>""
  720 IFLEFT$(file$,1)="*" OSCLI(file$)
  730 UNTILLEFT$(file$,1)<>"*"
  740 PRINT'CHR$131"Enter the filename u
nderwhich the"CHR$131"edited screen is
to be saved"
  750 REPEAT:INPUTfile2$:UNTILfile2$<>""
  760 VDU22,mode%
  770 OSCLI("*LOAD "+file$)
  780 ENDPROC
  790 DEFPROCinitial
  800 IFmode%>=0ANDmode%<4 OSCLI("LOAD O
BJECT1") ELSE OSCLI("LOAD OBJECT2")
  810 ?&8B=mode%
  820 x%=572:y%=576:quad%=1
  830 MemToScreen%=&900
  840 IFmode%>2 ScreenToMem%=&92B:Magnif
y%=&965 ELSE ScreenToMem%=&929:Magnify%=
&961
  850 VDU23;8202;0;0;0;
  860 escape%=FALSE
  870 IFmode%=0 A=31:B=17:C=14:editstep%
=8:white%=1
  880 IFmode%=1ORmode%=4 A=124:B=68:C=56
:editstep%=16:white%=3
  890 IFmode%=2ORmode%=5 A=248:B=136:C=1
12:editstep%=32:white%=7
  900 VDU23,128,0,A,B,B,B,A,0,0;23,129,0
,0,C,C,C,0,0,0
  910 IFmode%=4 white%=1
  920 IFmode%=5 white%=3
  930 magstep%=16:IFmode%>2 magstep%=32
  940 ENDPROC
  950 DEFPROCerror
  960 VDU22,7;7:REPORT:PRINT"Press Spac
e-Bar to continue.":REPEATUNTILGET=32
  970 ENDPROC
  980 DEFFNshift=INKEY(-1
  990 DEFFNleft=INKEY(-           (-26)
 1000 DEFFNright=INKEY            (-122)
 1010 DEFFNup=INKEY(-             )
 1020 DEFFNdown=INKE              -42)
 1030 DEFFNtab=INKEY
 1040 DEFFNescape=IN
 1050 DEFFNgetcolour
 1060 IFINKEY(-40)TH
 1070 IFINKEY(-49)TH
 1080 IFmode%=0ORmode
 1090 IFINKEY(-50)THE
 1100 IFINKEY(-18)THEN
 1110 IFmode%=1ORmode%=
 1120 IFINKEY(-19)THEN=4
 1130 IFINKEY(-20)THEN=5
 1140 IFINKEY(-53)THEN=6
 1150 IFINKEY(-37)THEN=7
 1160 IFINKEY(-22)THEN=8
 1170 IFINKEY(-39)THEN=9
 1180 IFINKEY(-66)THEN=10
 1190 IFINKEY(-101)THEN=11
 1200 IFINKEY(-83)THEN=12
 1210 IFINKEY(-51)THEN=13
 1220 IFINKEY(-35)THEN=14
 1230 IFINKEY(-68)THEN=15
 1240 =-1
 1250 DEFPROCbox(x%,y%,m%)
 1260 GCOL3,white%
 1270 MOVEx%,y%:DRAWx%+132,y%:DRAWx%+132
,y%-98:DRAWx%,y%-98:DRAWx%,y%
 1280 IFm%<>1 ENDPROC
 1290 IFmode%>2 memloc%=&5801+(320*(256-
y%/4)DIV8)+x%/4 ELSE memloc%=&3002+(640*
(256-y%/4)DIV8)+x%/2
 1300 ?&84=memloc%MOD256:?&85=memloc%DIV
256
 1310 CALL Magnify%
 1320 ENDPROC
 1330 DEFPROCquad(m%)
 1340 GCOL3,white%
 1350 IFquad%=1 MOVE0,636:DRAW512,636:DR
AW512,1024:?&80=&00:?&81=&30 ELSEMOVE764
,0:DRAW764,384:DRAW1280,384:?&80=&80:?&8
1=&63
 1360 IFmode%>2ANDquad%=1 ?&81=&58 ELSEI
Fmode%>2 ?&80=&C0:?&81=&71
 1370 IFm%=1 CALL MemToScreen%
 1380 IFm%=2 CALL ScreenToMem%
 1390 ENDPROC
 1400 DEFPROCfinish
 1410 PROCquad(1):PROCbox(x%,y%,2)
 1420 *FX200,0
 1430 *FX15,0
 1440 IFmode%>2 A$=" 5800"ELSE A$=" 3000
"
 1450 OSCLI("SAVE "+file2$+A$+" 8000")
 1460 ENDPROC
```

Get it right!

```
  10 =    0 0    500 = A180 5    990 = 39FC 7
  20 =    0 0    510 = 2F44 A   1000 = ED65 2
  30 =    0 0    520 = ED0F 4   1010 = 2256 C
  40 = 7C44 4    530 =  10B 1   1020 = DAE1 1
  50 = 2FD3 2    540 = 318E 0   1030 = EDE1 9
  60 = 40B5 9    550 =  9C7 E   1040 = AA2B 1
  70 = 8B88 E    560 = 7B51 C   1050 = EFFF D
  80 = 2CA9 9    570 = B4E4 5   1060 = FA0A 0
  90 = 3630 6    580 = BFBA B   1070 = 4257 2
 100 = BFBA D    590 = 5C06 7   1080 = AA42 8
 110 = BFBA C    600 = 892E F   1090 = 9FE8 8
 120 = EBC8 3    610 = DCAB 2   1100 = 8B45 B
 130 = C4FE 1    620 = A5A5 E   1110 = 4570 7
 140 = FD63 2    630 = A7BC 2   1120 = 51F3 B
 150 = DC66 2    640 = 2A9C 8   1130 = 274E 3
 160 = 2693 A    650 = B112 B   1140 = 31BE B
 170 = 2ECA B    660 = E86C E   1150 = 2578 C
 180 = FA41 5    670 = BFBA 2   1160 = B260 1
 190 = E04D 3    680 = BFBA E   1170 =  B1E 5
 200 = 980F F    690 = 6540 6   1180 = AC35 2
 210 = 1DC3 5    700 = 86B5 3   1190 = DEE9 5
 220 = 3022 A    710 = 6093 1   1200 = FDFE 1
 230 = 63DF C    720 = 1336 6   1210 = 8C95 7
 240 = 6985 3    730 = C5B7 1   1220 = 5BF6 0
 250 = CA45 A    740 = 7FA4 8   1230 = 7C33 E
 260 = 12C5 1    750 = A0A9 0   1240 = D13C C
 270 = 643F B    760 = 6315 3   1250 = 826A 3
 280 = 6C86 5    770 = 8D1C 6   1260 = 1772 B
 290 = 4B77 F    780 = ED0F 0   1270 = 333E D
 300 = BFBA 4    790 = C10F 7   1280 = 8832 2
 310 = EBC8 A    800 = 844A B   1290 = 6D77 2
 320 = FCBB 5    810 = F0B1 5   1300 = 9CDB 3
 330 = 6AFF 5    820 = A276 3   1310 = 7971 A
 340 = F050 5    830 = DDB1 3   1320 = ED0F A
 350 = F5B0 C    840 = 84C1 3   1330 = FF19 B
 360 =  2B2 9    850 = F716 0   1340 = 1772 8
 370 = 86E2 A    860 = E5D7 D   1350 = 733F 4
 380 = 46C7 C    870 = A62E F   1360 = D8CF 3
 390 =   92 F    880 = A9A9 8   1370 = 7A8E 1
 400 = 7147 9    890 = D965 9   1380 = 9E3F 8
 410 = 579A C    900 = C33F A   1390 = ED0F 9
 420 = EFD8 2    910 = BBD4 8   1400 =  275 0
 430 = BF4D 2    920 = F4D3 B   1410 = 6114 2
 440 = 6985 F    930 = 2B93 C   1420 = 3FF2 F
 450 = F9E8 D    940 = ED0F 1   1430 = 6C86 D
 460 = CA45 B    950 = D7A7 D   1440 = 611F 9
 470 = 4B77 B    960 = F074 E   1450 = C183 6
 480 = E014 F    970 = ED0F 8   1460 = ED0F 5
 490 = FD2E C    980 = B847 C
```

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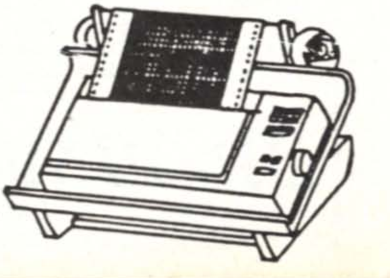

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TECHNOMATIC DISC DRIVES

TS 400

PD 800P

A range of high quality high performance drives to meet the needs of all BBC Micro Users.

All drives fitted with high quality, slim line Japanese drive mechanism and necessary cables.

*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering fast track access and head setting times. Our confidence in their quality enables us to offer a two year warranty on these mechanisms without any extra charge.

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5.25" Single Drives 40/80 switchable:	
TS400 400K/640K	£105 (b)
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5.25" Dual Drives 40/80 switchable:	
TD800 800K/128OK	£185 (a)
PD800 800K/1280K with integral mains power supply	£209 (a)
PD800P 800K/1280K with integral mainspower supply and monitor stand	£229 (a)
3.5" 80T DS Drives:	
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PS351 single 400K/640K with integral mains power supply	£99 (b)
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P40HD TECHNOMATIC 40 Mbyte Winchester Drive with Acorn ADFS ROM	£749 (a)
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TS10 10 Mbyte Tape Streamer Backup unit with utilities.	£599 (a)
TFC10 10 Mbyte Pre-formatted Cartridge for use with P2041HT and TS10.	£19 (d)
Special adaptor for S.J. File Server	£28 (d)

Enquire for larger capacity Winchesters.
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TWM2 for two computers.	£99 (b)
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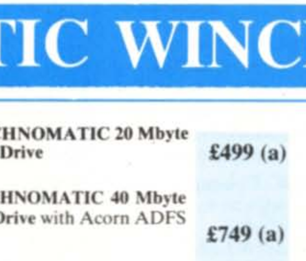
746 80T SS DD	£11.50 (d)
747 80T DS DD	£13.25 (d)

(Add £1 for library case packing)

3.5" Discs in packs of 10	
80T SS DD	£15 (d)
80T DS DD	£19.50 (d)



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50 5.25" 80 T double sided discs with sleeves in lockable box.	£36 (b)
50 3.5" 80 T double sided discs with sleeves in lockable box.	£60 (b)
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5.25" Kit with 20 disposable discs	£12.50 (d)
3.5" Kit with 20 disposable discs	£14.00 (d)
DISC STORAGE BOXES	
DB340 Lockable 40 x 3.5"	£8.50 (c)
DB550 Lockable 50 x 5.25"	£6.50 (c)
DB570 Lockable 70 x 5.25"	£8.50 (c)
DB5100 Lockable 100 x 5.25"	£10.50 (c)

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EPSON FX800 An enhanced version of FX85. Call for details.	£315 (a)
EPSON FX1000 An enhanced version of FX105. Call for details.	£439 (a)
EPSON EX800	£409 (a)
EPSON EX1000	£595 (a)
Colour option for EX800/EX1000.	£59 (b)
EPSON LQ800	£399 (a)
EPSON LQ1000 As LQ800 but wider carriage for 136 columns.	£609 (a)
TAXAN KP815 Enhanced KP810 with 160cps and full IBM compatibility.	£269 (a)
TAXAN KP915 Enhanced KP910 with 180cps and full IBM compatibility.	£369 (a)
NATIONAL PANASONIC KX P1081	£149 (a)
STAR NL 10 (Parallel Interface)	£190 (a)
STAR NL 10 (Serial Interface)	£219 (a)
INTEGREX Multicolour Inkjet printer. Ideally suited for high res colour VDU screen dumps. Quiteness & consistent output are major characteristics.	£549 (a)
BBC Screen dump for Integrex.	£15 (d)
BROTHER HR20 8K buffer standard expandable to 16K. Parallel & Serial ports as standard.	£349 (a)
NAT PANASONIC KX P3131 Daisy wheel printer with 38K buffer, 17 cps, bi-directional, parallel interface	£249 (a)
JUKI 6100 Daisy wheel printer 15 cps, 2K buffer, switchable 10/12/15 cpi proportional spacing, underlining. Parallel interface.	£295 (a)
Parallel Printer Lead (1.2m)	£6 (d)

MODEMS

All modems listed below will be supplied with BBC Publications ModemMaster comms package and a BBC data lead.

MIRACLE WS4000 V21/23	£135 (b)
MIRACLE WS3000 V21/23	£244 (b)
MIRACLE WS3000 V22	£409 (b)
MIRACLE WS3000 V22 bis (All modems are BABT approved)	£537 (b)
BBC Data Cable for WS3000/4000	£7 (d)
MIRACLE WS2000V21/23 & BELL stds	£92 (c)
WS2000 Auto Dial Card	£27 (d)
WS2000 Auto Answer Card	£27 (d)
WS2000 SK1 Kit	£5 (d)
WS2000 User Port Lead	£5 (d)

TIME WARP

Real Time Clock. Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program	£29 (d)

PLOTTERS

HITACHI 672	£465 (a)
LINEAR GRAPHICS	
A4S PLOTMATE	£282 (a)
A4SM PLOTMATE	£342 (a)
A3 PLOTMATE	£299 (a)
A3M PLOTMATE	£431 (a)

Full range of accessories available for plotmate plotters

PRINTER SHARERS & BUFFERS

BUFFALO PB Buffer Parallel buffer for internal fitting to most Epson printers. Simple to instal. **PB128** (128K)	£89 (c)

PERIPHERAL & COMPUTER SHARERS

High quality switches to allow the user to switch between computers, printers, modems etc. Fully shielded metal cases, all lines fully switched.

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2 Computers to 1 Printer 36v36-2	£25(c)	25v25-2	£25(c)
3 Computers to 1 Printer 36v36-3	£39(c)	25v25-3	£39(c)
4 Computers to 1 Printer 36v36-4	£45(c)	25v25-4	£45(c)
2 Computers 2 Printers X-over 36v36-x	£49(c)	25v25-x	£49(c)
BBC Cable set 3 to 1 (1m ea)	£24(c)		
BBC Cable set 4 to 1 (1m ea)	£30(c)		

BBC Computer Sharer: TCS26 1 computer to 2 printers fitted with BBC cable	£17 (c)

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Plain fanfold paper with microperforation:

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1500 sheets A4 90gsm	£18.00 (£4.00)

Labels/1000

Single Row 3½ × 1 7/16"	£5 (d)
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PROGRAMMING ACCESSORIES/SOFTWARE

Compatible with B, B+ and Master

EpromRyter (Epromer II) Eprom Ryter is compatible with BBC Master only. See page 7.	£119 (b)
Upgrade of Epromer II to Eprom Ryter (Please return your Epromer II)	£49 (b)
EPROMER II	£89 (b)
MPROMER	£49 (c)
META ASSEMBLER	£145 (b)
PORTAL EPROM EMULATOR 512K	£245(b)
TEAM Disassembler	£145 (b)
EPROM ERASERS	
UV1B 6 eproms, safety cutout	£47 (b)
UV1T 6 eproms, timer, safety cutout	£59 (b)

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BBC lead incl with all monitors

MICROVITEC 14" RGB Monitors
Please specify plastic or metal case.

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Microvitec 1431AP As 1431 + composite video and sound input	£199 (a)
Microvitec 1451 Medium Resolution 653 pixels	£225 (a)
Microvitec 1451AP As 1451 + composite video and sound input	£255 (a)
Microvitec 1441 High Resolution 895 pixels	£359 (a)
Philips 14" RGB Med Res, high contrast screen, TTL/Linear Input, Mono/Colour Switch Sound Input. Seperate controls for brillance and contrast.	£195 (a)

Microvitec 20" RGB/PAL/Audio Monitors

Microvitec 2030CS Standard Resolution RGB/Comp Video	£380 (a)
Microvitec 2040CS High Resolution RGB/Comp Video	£685 (a)
TOUCHTEC-501 Brings genuine touch screen operation on metal cased Microvitec monitors, incl utilities disc with starter and development programs	£239 (b)
TAXAN SUPER VISION 620 12" Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible	£269 (a)
TAXAN SUPER VISION 625 12" Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible.	£319 (a)

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TAXAN KX 118 Hi Res Long Persistence (P39)	£90 (a)
TAXAN KX 119 Hi Res amber etched screen	£90 (a)
PHILIPS BM 7502 Hi Res green screen.	£69 (a)
PHILIPS BM7522 Hi Res amber screen.	£75 (a)
PHILIPS BM 7542 Hi Res White screen.	£79 (a)

MONITOR ACCESSORIES

Microvitec Swivel Base (14" plastic monitors)	£17 (c)
Philips Swivel Base	£10 (c)
Monitor Stand Models B & B+	£10 (c)
Monitor Stand Master	£13 (c)
Double Tier stand Models B, B+ or Master	£24 (b)
Taxan RGB Lead	£5 (d)
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Monochrome BNC/Phono Lead	£3.50 (d)

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Cad Package for B, B & MASTER.
(See page 5 for specification)

Tracker Ball/Mouse Version (TM)	£49 (d)
TM Version plus Tracker Ball	£94 (d)
TM Version plus Mouse	£79 (d)
Plotter Driver Generator	£15 (d)

MOUSE

AMX MOUSE with SUPER ART (pse specify B, B+ or Master)	£63 (d)
PAGEMAKER	£32 (d)
EXTRA/EXTRA (utility for the Pagemaker)	£19 (d)
MAX	£17 (d)
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RB2 Tracker Ball with Cursor Control Rom (for Master only)	£59 (c)
RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software)	£47 (c)
Cursor Control Rom for Master	£12.50 (d)
MIRRORSOFT FLEET STREET EDITOR	£35 (d)

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Send for details on our full range of CP/M & PC DOS packages for Business, Communications & High Level Languages.

Please send for details on our range of CP/M software for Acorn/Torch Z80 2nd Processors

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All software supplied by us is known to operate with the appropriate Acorn Disc filing systems. We **cannot** *comment on their use with other DFS systems.*

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VIEWSTORE	£37 (d)
STARdataBASE	£39 (d)
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ACORN OVERVIEW PACKAGE Special Offer (RRP £86)	£57 (b)

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VIEW 2.1	£35 (d)
VIEW 3.0	£48 (c)
VIEW INDEX	£12 (d)
VIEW PRINTER DRIVER GENERATOR	£7 (d)
VIEWSPELL	£29 (d)
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WORDWISE PLUS	£38 (d)
WYSIWYG PLUS	£21 (d)
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SPELLCHECK III	£31 (d)
EDWORD II	£43 (c)

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WINDOWMATIC	£15 (d)
VIEWPLOT	£22 (d)
INTERSHEET	£37 (d)
INTERCHART	£26 (d)
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For B & B+ 40T or 80T	£14.75 (d)
For Master 80T	£17.30 (d)
For Compact	£19 (d)
MINI OFFICE II ROM Version For Master, Compact, B+ & B	£48 (c)

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OXFORD PASCAL for Master	£52 (d)
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BBC PUBLICATIONS OPEN LOGO	£59 (c)
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ACORN FORTH ROM	£39 (d)
ACORN COMAL ROM	£39 (d)
MICROTEXT	£52 (c)
MICROTEXT PLUS	£229 (b)

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SLEUTH	£23 (d)
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PRINTMASTER	£24 (d)
PRINTWISE	£24 (d)
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MOVIE MAKER Two Roms + Cassette	£26 (d)
ADV TELETEXT UTILITIES ROM	£7.95 (d)

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FONT EDITOR	£22 (d)
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WHITE KNIGHT MKII	£16 (d)
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SEC.SCIENCE:THE MOLE CONCEPT	Disc/Aud/EC£16 (c)

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WHITE KNIGHT MK II (for compact)	Disc£16 (d)
BATTLEFIELDS	Cass£8.50 (d)
A VOUS LA FRANCE	Cass/EC£17 (d)
	Book£5.25 (d)
	Audio Cassettes (2) £7.50 (a)
Additional charges for discs	£9.00 (d)
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	Book£5.95 (d)
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No VAT Carriage Code (c)

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6502 Assy Lang Prog	£19.95
6502 Programming	£13.95
8086 Book	£23.95
Acorn BCPI User Guide	£15.00
Acorn FORTH	£7.50
Acorn LISP	£7.50
Acorn ISO Pascal Ref Manual	£10.00
Intro to COMAL	£10.00
Intro to LOGO	£7.50
Micro Prolog Ref Manual	£10.00
Introduction to Turbo Pascal	£14.95
Prog the Micro with Pascal	£8.50
The Supervisor's BBC Micro	£10.95

BBC MICRO GUIDE BOOKS

Inside Information	£8.95
Maths Prog in BBC Basic	£7.95
The Friendly Computer Book	£4.50
Toolbox 2	£10.95

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Advanced Sideways Ram User Guide	£9.95
Advanced User Guide (BBC)	£15.95
Applied Assembly Language on the BBC	£9.95
BBC Micro Advance Programming	£9.95
BBC Micro Ref Guide (B Smith)	£10.95
BBC Micro Sideways ROM's RAM's	£9.95
Guide to the BBC Rom	£9.95
Beginners Guide to W.P.	£7.95
Mastering Assembly Code	£8.95
Mastering Interpreters & Compilers	£14.95
Mastering View, Viewsheet & Viewstore	£12.95
View by B. Smith	£12.95
View 3.0 User Guide	£9.00
Viewstore User Guide	£9.00
Viewsheet User Guide	£9.00
Wordwise Plus	£9.95

SOUND & GRAPHICS

Computer Graphics & CAD Fundementals	£9.95
Mastering Music	£6.95

DISC DRIVE SYSTEMS

Advanced Disc User Guide	£16.95
Disc Book	£3.50
Disc Programming Techniques	£7.95
Disc Systems	£6.95
File Handling on the BBC	£6.95
Discovering Disc Drives	£POA
Practical Disc File Techniques	£5.95
Mastering the Disc Drive	£12.95
Mastering DOS plus	£12.95

APPLICATIONS

Interfacing Proj for BBC	£6.95
BBC and Small Business	£5.75
The Software Business	£5.50

Mastering Operating System (David Atherton) £12.95

WYSIWYG PLUS

WYSIWYG PLUS is a printer and screen utility for Wordwise Plus, View, Interword, and Basic users, supplied on a 16K Eprom. To obtain a particular printer effect, such as enlarged text, it used to be necessary to discover the appropriate 'printer control code' from your manual and incorporate it into your text. Secondly, you had to print several trial copies in order to position the effect correctly in relation to the rest of your text.

WYSIWYG PLUS simplifies this trial and error approach using easily remembered *commands. For example, *ENLARGED not only selects enlarged text on your printer, but uniquely shows you double width characters on your screen, even from within Wordwise Plus!

WYSIWYG PLUS incorporates a logo editor. Just draw your design on screen using the arrow keys, and save the results. Use the *GRAPHICS command to incorporate your design anywhere in your text; position and see your design in your text before faithfully reproducing a hard copy.

There is also special help for daisy wheel users. The *WHEEL command will prompt you to change daisy wheels whenever a change in type style is about to occur.

WYSIWYG PLUS is designed to work with the following systems:

BBC Model B
BBC Model B+
BBC Master 128
BBC Compact

6502 Second processor,
Turbo coprocessor
All printers (Except lasers)

WYSIWYG PLUS workspace is relocatable.

WINDOWMATIC

All users of Acorn's VIEWSHEET speadsheet program will be aware of its powerful windowing facility which allows the screen and/or printer to be configured in up to 10 seperate windows taken from anywhere in the sheet. They will also be painfully aware of how difficult and time consuming it is to set up a required display. Although VIEWSHEET allows configurations to be saved to the media, it does not have provision for deciphering them.

WINDOWMATIC has been produced with the intention of rectifying these shortcomings and to bring out the very best from VIEWSHEET.

WINDOWMATIC provides a quick and easy way to configure screen and printer allowing complicated documents and reports to be set up much more easily. It displays complete text information on all 20 windows and accurate graphic representation of the screen and printer output.

The package includes a screen dump routine for Epson printers and allows use of other printer dump packages.

WINDOWMATIC is compatible with BBC Master and BBC B+. A 6502 2nd processor must be fitted to a model B to run Windowmatic. Windowmatic is fully compatible with Turbo and 6502 2nd processor.

The program is supplied on disc with a comprehensive manual.

VU-TYPE

Do you have finger trouble when typing?
Do your letters look like this?

Dear Sor,
I wuold like to .....

then you need:

VU-type, a complete touch typing program produced by BBC/Pitman.

It allows you to learn at your own pace and has a wide range of exercises. Screen displays show the keys you have pressed and it will report on your speed and accuracy.

Supplied on a 40T Disc with a manual.

Available at a special price of £7.50(d) instead of the usual £15. Offer valid while stocks last

EDUCATIONAL/FUN SOFTWARE BUNDLE

Wordmover
Wordplay
Pantry Antics
Drawstick
Locomotion

These programs are supplied from the BBC Publications Educational Software range and will be supplied on a 5.25" disc for BBC Master, B+ and B and on a 3.5" disc for the Compact.

5.25" Disc	**£17.50(d)**
3.5" Disc	**£18.50(d)**

(Normal RRP over £40)

PRINTER ACCESSORIES

EPSON ACCESSORIES:

Interfaces

8143 RS232	**£30 (d)**
8148 + RS232 + 8k	**£65 (d)**
8177P NLQ for FX80 +/FX100 +	**£99 (d)**

Parallel & Serial Buffers of various size also available.

LQ800 Tractor Feed	**£47 (b)**
LQ1000 Tractor Feed	**£52 (b)**

SHEET FEEDERS:

LQ800	**£135 (b)**
LQ1000	**£179 (b)**
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FX800	**£135 (b)**
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RX/FX100/100 +, FX105	**£7 (d)**
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Aqueous Pen Set six pens	**£18.50 (d)**
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NOVACAD

Computer Aided Draughting for the BBC Micro

> *"Novacad can drive a plotter to provide drawings of a high quality... Novacad is excellent. It is flexible, genuinely easy to operate without much practice, and a pleasure to use."* **Beebug December 1986**

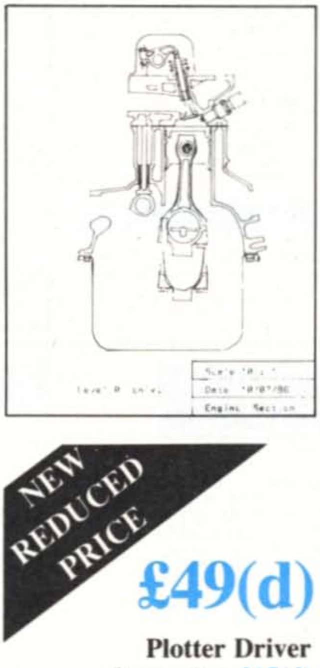
> *"Novacad is a professional package, well worth the £90 for the ROM and disc and is expandable to suit your own particular requirements. I would have no reservations if I heard Novacad called, "the best on the market"."* **A&B Computing August 1986**

A sophisticated CAD package with unique facilities which are generally confined to the professional CAD packages costing thousands of pounds.

NOVACAD is being used in widely differing fields ranging from leading British industries for producing engineering drawings to Accountants' offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing professional quality output are making extensive use of NOVACAD's unique features. NOVACAD is proving to be a invaluable teaching aid in technical schools and colleges simply because of the ease with which it can be used.

NOVACAD'S MAJOR FEATURES

- Simple and easy to use with logical command sequence.
- A large drawing area (approx 15 screens).
- The ability to create complex icons (upto 500 lines instead of the usual 15 to 20 pixels), store them in a library and recall them at different scales and orientations.
- A zoom facility allowing magnification of up to 20 times to insert finer details.
- Block copy of shapes on the screen for repetitive use.
- Text entry at any 90° orientation at any position on the screen.
- Create multi layer drawing with 8 levels available.
- Full compatibility with the BBC range with minimal hardware requirements yet having the capability of exploiting the potential of the extra shadow memory or the second processor's memory and speed.
- Printer routine for Epson 80 and 136 column printers.
- A unique optional facility to output to any BBC compatible plotter.
- Cursor control from keyboard, tracker ball or mouse.



NEW REDUCED PRICE

£49(d)

Plotter Driver Generator £15(d)

NOVACAD is compatible with all BBC models fitted with Acorn DFS. It has minimum hardware requirements of a single drive and a Epson compatible printer to get started though NOVACAD will utilise fully a dual drive system and 6502 2nd processor or the shadow ram on the B+ series. To obtain high quality drawings we recommend a BBC compatible plotter and our plotter driver generator.

With basic BBC B, NOVACAD operates in mode 4 allowing use of any 2 colours. With shadow memory of the BBC+ or the Master, it can also operate in mode 0 for higher resolution or mode 1 for allowing use of any 4 colours, and it will provide additional user memory for more complex drawings.

6502 second processor or the Turbo on the Master will also increase the drawing speed considerably.

OPTIONAL EXTRAS

Plotter driver generator is available as an optional extra to configure a plotter routine for any BBC compatible plotter. Pre-configured programs for the popular plotters like **Epson HI 80, Hitachi 672, Plotmate, Penman** and **HP GL.** This program allows the drawing to be scaled to the maximum plotter size thus enabling drawing of A2 and A3 sizes to be produced with equal ease. The zoom facility will enable inaccuracies of drawing on the screen to be eliminated.

BBC SPARE PARTS

BBC B & General

Power Supply	**£52.00 (b)**
Keyboard Connector	**£5.00 (d)**
Complete Keyboard	**£52.00 (b)**
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WD1770	**£24.00 (d)**
68B54	**£8.00 (d)**
75159	**£2.20 (d)**
76489	**£4.00 (d)**

BBC B +

Keyswitch (state type)	**£1.75 (d)**
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B+ OS	**£18.00 (d)**
4864-12	**£3.00 (d)**
PAL16RH	**£18.00 (d)**
1770 DFS ROM	**£17.50 (d)**

BBC MASTER

Power Supply	**£65.00 (b)**
Keyboard Connection	**£3.75 (d)**
Keyboard	**£65.00 (b)**
Keyswitch (state type)	**£1.75 (d)**
1 Mb OS ROM	**£39.00 (d)**
CF30060 ULA	**£10.00 (d)**
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74F74	**£1.40 (d)**
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9637	**£2.00 (d)**
32.768 MHz Xtal	**£2.00 (d)**

2nd PROCESSORS

ULA (512)	**£34.00 (d)**
ULA (6502 & Z80)	**£28.00 (d)**
Power Supply	**£42.00 (b)**

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EpromRyter

*Highly sophisticated & Advanced Programmer

*Handles all current 1 rail Eproms

*State of the Art Programming Algorithms

EpromRyter is a powerful eprom programmer designed for use with the BBC Master Computer. It takes full advantage of the latest developments in the eprom technology and the extra facilities on the Master to provide fast, simple and efficient programming and editing facilities.

The software is totally menu driven and on screen help messages make the programming simple for both specialists and novices alike.

The EPROMRYTER interfaces with the Master through 1 MHz bus. It is mains powered with its own psu. 3M Textool zif socket has been fitted to ensure consistent and reliable service over long periods.

The single rail eproms handled by the EpromRyter are:
- 2716 2732 2764 27128 27256 27512 27513 27011 2516 2532 2564 (NMOS & CMOS)
- One time eproms P27XXX, 87CXXX etc.
- Also A suffix eproms such as 27XXXA

EpromRyter

The main features of the programming software are:

- * Device, function and voltage selection from the computer keyboard.
- * Continuous display of the options selected.
- * All eproms upto 27512 (64K) programmed in single pass.
- * Automatic Intelligent identifier support for eproms able to respond.
- * Selectable programming voltage 25/21/12.5V
- * 3 programming methods: Normal, Intelligent & Pulse (30 sec for a 27128).
- * Serial port protocols supported incl Intel Hex & Motorola S.
- * DFS, NFS, ADFS and Rom Filing System Supported.
- * BASIC/Machine Code programming using RFS.
- * Powerful editor with input in HEX or ASCII. * Full editable 64K file.
- * Block move of data within the address range.
- * User can select any section of the eprom from single byte to the full address range to blank check/burn/verify. Facility to program single bytes makes program development/amendment simpler.
- * Multiple loading for ROM Filing System

Some of the above features apply to Master Computers only

EPROMER II

A proven Eprom programmer for BBC Model B and B+ with thousands in use in industry, educational and R&D establishments. It offers many of the powerful features of the EpromRyter and can program all single rail eproms upto 27256. Full details on request.

META Version III

"All the good features you would expect to find in a good source code editor are present . . . Meta assembler lives in a different world. It is structured to work with any new processor . . . as new instruction sets can be added . . . as needed . . . has a well featured editor with colour highlighting, a sound modular approach."
Acorn User October 1986

- Assembles for over 30 popular processors, including Z80, 6800/01/02/04/05/09/11 etc — and 68000 — using native mnemonics for each processor, eg. LD A, (HL) for Z80 and MOV AO, $1000 for 68000 etc.
- Fully integrated Editor: four field, all search, search/replace, block copy, delete, move, marked save, load etc.
- Compatible with Portal Eprom Emulators and Team Disassemblers.
- Send object code in Intel Hex, S-Record, straight binary etc. down to discs, RS232, parallel port, Eprom Emulators etc — all **during Assembly.**
- Over 50 directives included as standard: handling nestable macros, conditional assembly and twenty types of table definition directives.
- 32 bit labels; 31 character names. Arithmetic and Boolean arithmetic to 32 bits.
- Modular source code with numeric and string parameter passing.
- Serial communicator area with eight options lines: echo, control code trap, LF supression/addition etc.
- Over 500 in use throughout the world in universities and many different industries.
- Two 16K Roms, two 80 track discs, A4 ring-band manual, function-key strip.

PORTAL EPROM EMULATORS

- Emulates 2716, 2732, 2764, 27128, 27256, 27512 eproms at 150ns Access time.
- Load at 4Kbytes/second — No "erase" time.
- 28 pin header plugs into Eprom socket on target system — status monitored on 13 Leds.
- Fully software controlled from Meta Assembler.
- 100 times faster than standard EPROM program/erase cycle.
- Fully CMOS compatible; draws no power from target system.
- Four portals may be independently programmed off same user-post cable.
- Complete with all cables, manual and disc.

PORTAL 512 (2716, 2732, 2764, 27128, 27256, 27512).

TEAM DISSASSEMBLER

The third part of the Universal Development System: a Meta labelling dissassembler.

Supports 1802, 8080, 8085, HD64180, Z80, 65XX (includes 65 col, 6511 etc), 68XX (includes 00, 01, 02, 03, 08 etc):

- Up to 64K of object code translated back into META compatible source code modules: labels automatically inserted on all jump targets, memory references etc.
- Pre-editing stage allows marking of object code areas as byte, string, word, long word etc, tables. These areas dis-assembled into appropriate directives instead of garbage mnemonics.
- Reconstituted source code ready for immediate re-assembly by META.
- Omniversal search/replace for re-naming arbitary label names with meaningful ones.

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FILE LISTER

Print your text and Basic programs in columns with Steve James' utility

ONE of the troubles with producing listings of Basic programs is the excessive amount of wasted paper.

Most statement lines in Basic tend to be quite short, leaving large amounts of blank paper. Also some programs cannot be listed because of embedded, intentional or otherwise, control codes which cause the printer to do all sorts of interesting things.

When working at home space is usually at a premium, and it is difficult to debug a program when the listing is over a number of pages. Trying to find where a procedure or function is defined in a listing can be very annoying and time-consuming.

What is needed is a way to produce listings without wasting paper and clearly showing program sections. With this in mind, and other enhancements like printing pure text in columns with right justification, the Lister was developed.

This program can list in up to four columns per page, which is a saving of up to 60 per cent in Basic. It will handle both Basic programs and Ascii text files and will output to printer directly or to disc for later printing.

Type in the program exactly as shown and ensure you haven't made any errors by using the checksums. When you run the program select the options you require and the source filename, then execute the print routine.

The actual printing can take quite a time, depending on the file size and column width, but it's certainly a very useful utility.

```
   10 REM Multicolumn File Lister
   20 REM Written by  S E James
   30 REM (c) The Micro User
   40 MODE7:DIM p$(68):*FX229,1
   50 spc$="=":hex$=CHR$145:*FX4,1
   60 FOR Y%=0 TO 1:VDU141,132,157,135
   70 PRINT"LISTER"CHR$140SPC2;
   80 PRINT"Multicolumn listing":NEXT
   90 VDU28,0,24,39,2:FOR I%=1 TO 68
  100 p$(I%)=STRING$(150,"*"):NEXT
  110 PRINTTAB(0,1)CHR$134"C. Columns"TA
B(12,1)CHR$135"3"TAB(20,1)CHR$134"Column
 width"CHR$131" 37"TAB(0,2)CHR$134"W. Wi
dth"TAB(12,2)CHR$135"132"
  120 PRINTTAB(0,3)CHR$134"L. Length"TAB
(12,3)CHR$135"70"TAB(20,3)CHR$134"Print
Length"CHR$131" 66":PRINTTAB(0,4)CHR$134
"F. Format"TAB(12,4)CHR$135"BASIC"
  130 PRINTTAB(0,5)CHR$134"H. Header"TAB
(12,5)CHR$135"YES"TAB(0,6)CHR$134"D. Dev
ice"TAB(12,6)CHR$135"PRINTER"TAB(0,8)CHR
$134"S. Source"TAB(12,8)CHR$135
  140 PRINTTAB(0,10)CHR$134"O. Output"TA
B(12,10)CHR$135TAB(0,12)CHR$134"T. Title
"TAB(12,12)CHR$135TAB(0,14)CHR$134"X. Ex
ecute":PRINTTAB(0,16)CHR$134" Option"CHR
$135;
  150 columns%=3:colwidth%=37:width%=132
  160 throw%=70:header%=TRUE:basic%=TRUE
  170 src$="":src%=0:dst$="":dst%=0
  180 prnt%=TRUE:title$=STRING$(25," ")
  190 def%=FALSE:data%=FALSE:plen%=66
  200 esc%=FALSE:REPEAT PROCselect
  210 IF NOT esc% PROCmainsection
  220 VDU7:PRINTTAB(0,20)STRING$(39," ")
  230 UNTIL esc%:PROCquit:MODE7:END
  240 DEFPROCselect:VDU23,1,1;0;0;0;
  250 REPEAT esc%=FALSE
  260 opt$=FNalpha("",1,13,16):IF esc% E
NDPROC
  270 IFopt$="C" columns%=(columns% MOD4
)+1:PRINTTAB(13,1)RIGHT$(STR$(columns%),
1):PROCcolwidth
  280 IFopt$="W" width%=FNinteger(width%
,3,13,2):PROCcolwidth
  290 IFopt$="L" throw%=FNinteger(throw%
,2,13,3):PROCthrow
  300 IFopt$="F" basic%=NOT basic%:PROCf
iletype:PROCcolwidth
  310 IFopt$="H" header%=NOT header%:PRO
Cheader:PROCthrow
  320 IFopt$="D" prnt%=NOT prnt%:PROCdev
ice
  330 IFopt$="S" src$=FNalpha(src$,12,13
,8):PROCchksource
  340 IFopt$="O" dst$=FNalpha(dst$,12,13
,10):PROCchkoutput
  350 IFopt$="T" title$=FNalpha(title$,2
5,13,12)
  360 IFopt$="X" PROCchkexecute
  370 UNTIL opt$="X" AND (src%<>0) AND (
dst%<>-1)
  380 ENDPROC
  390 DEFPROCcolwidth:IF basic% colwidth
%=(width%/columns%)-6 ELSE colwidth%=(wi
dth%/columns%)-2
  400 PRINTTAB(34,1)RIGHT$("   "+STR$(co
lwidth%),3):ENDPROC
  410 DEFPROCfiletype:IF basic% PRINTTAB
(13,4)"Basic" ELSE PRINTTAB(13,4)"Ascii"
  420 ENDPROC
  430 DEFPROCheader:IF header% PRINTTAB(
13,5)"YES" ELSE PRINTTAB(13,5)"NO "
  440 ENDPROC
  450 DEFPROCdevice:IF prnt% PRINTTAB(13
,6)"Printer":dst%=0 ELSE PRINTTAB(13,6)"
Disc"SPC3":dst%=-1
  460 ENDPROC
  470 DEFPROCthrow:IF header% plen%=thro
w%-4 ELSE plen%=throw%-2
  480 PRINTTAB(35,3)RIGHT$("  "+STR$(ple
n%),2):ENDPROC
  490 DEFPROCchksource
  500 PRINTTAB(26,8)STRING$(12," ")
  510 IF src$>"" src%=OPENIN(src$)
  520 IF src%=0 VDU7:PRINTTAB(26,8)CHR$1
29CHR$157CHR$135"NOT FOUND"
  530 CLOSE#0:ENDPROC
  540 DEFPROCchkoutput
  550 PRINTTAB(26,Y%)STRING$(12," ");
  560 dst%=0:IF prnt% ENDPROC
  570 IF dst$>"" dst%=OPENIN(dst$)
  580 IF dst%<>0 VDU7:PRINTTAB(26,10)CHR
$129CHR$157CHR$135"EXISTS"
  590 CLOSE#0:ENDPROC
  600 DEFPROCchkexecute
  610 PROCchksource:PROCchkoutput
  620 IF src%=0 VDU7:PRINTTAB(26,8)CHR$1
29CHR$157CHR$135"SELECT":opt$=""
  630 IF dst%=-1 VDU7:PRINTTAB(26,10)CHR
$129CHR$157CHR$135"SELECT":opt$=""
  640 ENDPROC
  650 DEFPROCmainsection:src%=OPENIN(src
$):IF basic% byte%=BGET#src%
  660 VDU23,1,0;0;0;0;:IF (NOT prnt%) ds
t%=OPENOUT(dst$)
  670 P%=0:L%=1:line$="":word$="":PROCcl
ear:eof%=FALSE
  680 REPEAT
  690 IF basic% PROCbasic ELSE PROCascii
  700 UNTIL eof%
  710 PROCprintpage:CLOSE#0:ENDPROC
  720 DEFPROCclear:FORJ%=1TO plen%:p$(J%
)="":NEXT:line%=1:column%=0:ENDPROC
  730 DEFPROCbasic:byte%=BGET#src%:IF by
te%=&FF eof%=TRUE:ENDPROC
  740 Y%=BGET#src%:number$=RIGHT$("    "
+STR$(byte%*256+Y%),5):PRINTTAB(0,20)CHR
$131"PROCESSING LINE   "CHR$135;number$;
"   ":linelen%=BGET#src%:charcount%=3:qu
ote%=FALSE:data%=FALSE:def%=FALSE
  750 REPEAT PROCbasichar
  760 UNTIL charcount%=linelen%
  770 PROCbasicpage:line$="":ENDPROC
  780 DEFPROCbasichar:byte%=BGET#src%:ch
arcount%=charcount%+1
  790 :IF byte%=&DD def%=TRUE
  800 IF byte%=34 quote%=NOT quote%
  810 IF byte%>31 AND byte%<127 line$=li
ne$+CHR$(byte%):ENDPROC
  820 IF byte%>127 AND byte%<&80 PROCnon
ascii:ENDPROC
  830 IF byte%>&7F PROCtoken
  840 IF byte%=&8D PROClinenumber
  850 IF byte%=&DC data%=TRUE
  860 ENDPROC
  870 DEFPROCascii:IF EOF#src% eof%=TRUE
:ENDPROC
  880 REPEAT REPEAT
  890 byte%=BGET#src%:IF byte%>32 AND by
te%<127 word$=word$+CHR$(byte%)
  900 PRINTTAB(0,20)CHR$131"PROCESSING "
CHR$135;word$;SPC(20)
  910 UNTIL byte%=13 OR byte%=32
  920 IF LEN(line$)+LEN(word$)<=colwidth
```

This is one of hundreds of programs now available FREE for downloading on MicroLink

Turn to Page 124 ▶

◀ From Page 123

```
% line$=line$+word$:word$="":IF byte%=32
 line$=line$+" "
  930 IF LEN(line$)+LEN(word$)>colwidth%
 PROCasciipage:line$=word$:word$="":IF b
yte%=32 AND line$<>"" line$=line$+" "
  940 UNTIL byte%=13
  950 PROCasciipage:line$="":word$="":EN
DPROC
  960 DEFPROCnonascii:IF basic% line$=li
ne$+hex$+FNhex(byte%DIV16)+FNhex(byte%MO
D16):ENDPROC
  970 IF (NOT basic%) line$=line$+CHR$(b
yte%):ENDPROC
  980 DEFFNhex(I%)=MID$("0123456789ABCDE
F",I%+1,1)
  990 DEFPROCtoken:IF quote% OR data% PR
OCnonascii:ENDPROC
 1000 IF byte%=&8D ENDPROC
 1010 RESTORE:I%=byte%-&80:FORJ%=0TOI%:R
EAD bas$:NEXT:line$=line$+bas$:ENDPROC
 1020 DEFPROClinenumber:IF quote% PROCno
nascii:ENDPROC
 1030 byte%=BGET#src%:Y%=BGET#src%:Z%=BG
ET#src%:charcount%=charcount%+3:Y%=Y% EO
R ((byte% AND 48)*4):Z%=Z% EOR ((byte% A
ND 12)*16):line$=line$+STR$(Z%*256+Y%):E
NDPROC
 1040 DEFPROCbasicpage:S%=LEN(line$):IF
def% p$(line%)=p$(line%)+STRING$(6," ")+
STRING$(colwidth%,spc$)+" ":line%=line%+
1:PROCchkpage
 1050 line$=line$+STRING$(255-S%," "):I%
=1:p$(line%)=p$(line%)+number$+" "+FNbas
iccut(0)+" ":line%=line%+1:PROCchkpage:I
F S%<colwidth%+1 ENDPROC
 1060 REPEAT
 1070 p$(line%)=p$(line%)+STRING$(6," ")
+FNbasiccut(I%)+" ":line%=line%+1:PROCch
kpage:I%=I%+1
 1080 UNTIL S%<(I%*colwidth%+1)
 1090 ENDPROC
 1100 DEFPROCasciipage
 1110 G%=1:REPEAT
 1120 IF RIGHT$(line$,1)=" " line$=LEFT$
(line$,LEN(line$)-1)
 1130 UNTIL RIGHT$(line$,1)<>" "
 1140 IF LEN(line$)<colwidth% PROCstretc
h
 1150 p$(line%)=p$(line%)+LEFT$(line$+ST
RING$(colwidth%+2," "),colwidth%+2):line
%=line%+1:PROCchkpage:line$="":ENDPROC
 1160 DEFPROCstretch:G%=1:IF LEN(line$)<
colwidth%/2 ENDPROC
 1170 IF INSTR(line$," ",1)=0 ENDPROC
 1180 REPEAT
 1190 H%=INSTR(line$," ",G%):IF H%<>0 li
ne$=LEFT$(line$,H%)+" "+RIGHT$(line$,LEN
(line$)-H%):G%=H%+2 ELSE G%=1
 1200 IF G%>=colwidth% G%=1
 1210 UNTIL LEN(line$)=colwidth%
 1220 ENDPROC
 1230 DEFPROCchkpage:IF line%<plen% ENDP
ROC
 1240 line%=1:column%=column%+1:IF colum
n%<>columns% ENDPROC
 1250 PROCprintpage:PROCclear:ENDPROC
 1260 DEFFNbasiccut(x%):=LEFT$(MID$(line
$,x%*colwidth%+1,colwidth%)+STRING$(colw
idth%," "),colwidth%)
 1270 DEFPROCprintpage:IF line%=1 AND co
lumn%=0 ENDPROC
 1280 IF (NOT prnt%) PROCspool:PROCclear
:ENDPROC
 1290 PRINTTAB(0,20)CHR$131"PRINTING";SP
C(32):VDU2,21,1,15:P%=P%+1:IF header% PR
INT src$;SPC(5);title$;SPC(13);"Page ";P
%'
 1300 FOR J%=1 TO plen%:PRINT p$(J%):NEX
T:FOR J%=(header%*-2)+plen%+1 TO throw%:
PRINT:NEXT:VDU6,3:PROCclear:ENDPROC
 1310 DEFPROCspool:PRINTTAB(0,20)CHR$131
"SPOOLING";SPC(32)
 1320 IF header% t$=src$+STRING$(5," ")+
title$+STRING$(13," ")+"Page "+P%:FORJ%=
1TOLEN(t$):BPUT#dst%,ASC(MID$(t$,J%,1)):
NEXT:BPUT#dst%,13
 1330 FOR J%=1 TO plen%:IF LEN(p$(J%))=0
 BPUT#dst%,13
 1340 IF LEN(p$(J%))>0 FORK%=1TOLEN(p$(J
%)):BPUT#dst%,ASC(MID$(p$(J%),K%,1)):NEX
T:BPUT#dst%,13
 1350 NEXT:FOR J%=(header%*-2)+plen%+1 T
O throw%:BPUT#dst%,13:NEXT:ENDPROC
 1360 DEFFNalpha(t$,L%,X%,Y%)
 1370 LOCAL K%,test%
 1380 REPEAT PRINTTAB(X%,Y%)t$SPC1;
 1390 VDU8:REPEAT K%=GET:esc%=(K%=27)
 1400 test%=(K%>31 AND K%<127)
 1410 UNTILtest%OResc%ORK%=13ORK%=127
 1420 IF test% IF LEN(t$)<L% t$=t$+CHR$K
%
 1430 IF K%=127 IF t$>"" t$=LEFT$(t$,LEN
(t$)-1)
 1440 UNTIL esc% OR K%=13 OR (L%=1 AND t
$>""):=t$
 1450 DEFFNinteger(val%,mant%,X%,Y%)
 1460 LOCAL mant$,K%:mant$=STR$(val%)
 1470 esc%=FALSE:REPEAT
 1480 PRINTTAB(X%,Y%)mant$SPC1;
 1490 VDU8:REPEAT K%=GET
 1500 UNTIL K%=13 OR K%=27 OR (K%>=48 AN
D K%<=57) OR K%=127
 1510 IF K%=27 esc%=TRUE
 1520 IF (K%>=48 AND K%<=57) IF LEN(mant
$)<mant% mant$=mant$+CHR$(K%)
 1530 IF K%=127 IF mant$>"" mant$=LEFT$(
mant$,LEN(mant$)-1)
 1540 UNTIL esc% OR K%=13:=VAL(mant$)
 1550 DATA "AND","DIV","EOR","MOD","OR",
"ERROR","LINE","OFF","STEP","SPC","TAB("
,"ELSE","THEN","<8D>","OPENIN","PTR"
 1560 DATA "PAGE","TIME","LOMEM","HIMEM"
,"ABS","ACS","ADVAL","ASC","ASN","ATN","
BGET","COS","COUNT","DEG","ERL","ERR"
 1570 DATA "EVAL","EXP","EXT","FALSE","F
N","GET","INKEY","INSTR(","INT","LEN","L
N","LOG","NOT","<AD>","OPENOUT","PI"
 1580 DATA "POINT(","POS","RAD","RND","S
GN","SIN","SQR","TAN","TO","TRUE","USR",
"VAL","VPOS","CHR$","GET$","INKEY$"
 1590 DATA "LEFT$(","MID$(","RIGHT$","ST
R$(","STRING$(","EOF","AUTO","DELETE","L
OAD","LIST","NEW","OLD","RENUMBER","SAVE
","<CE>","PTR"
 1600 DATA "PAGE","TIME","LOMEM","HIMEM"
,"SOUND","BPUT","CALL","CHAIN","CLEAR","
CLOSE","CLG","CLS","DATA","DEF","DIM","D
RAW"
 1610 DATA "END","ENDPROC","ENVELOPE","F
OR","GSUB","GOTO","GCOL","IF","INPUT","L
ET","LOCAL","MODE","MOVE","NEXT","ON","V
DU"
 1620 DATA "PLOT","PRINT","PROC","READ",
"REM","REPEAT","REPORT","RESTORE","RETUR
N","RUN","STOP","COLOUR","TRACE","UNTIL"
,"WIDTH","<FF>"
 1630 DEFPROCquit
 1640 *FX4,0
 1650 *FX229,0
 1660 ENDPROC
```

This listing is included in this month's tape & disc offer. See order form on Page 149.

Get it right!

```
  10 =    0 0 | 290 = B233 0 | 570 = 4AF7 3
  20 =    0 0 | 300 = A966 8 | 580 = A67A 1
  30 =    0 0 | 310 = 190C 9 | 590 = F1F8 A
  40 = 5096 6 | 320 = B49F 6 | 600 =  6A6 5
  50 = 1D84 3 | 330 = FA77 0 | 610 = E2DF 2
  60 = 644D 0 | 340 = E77E 6 | 620 = BD43 3
  70 =  BA5 2 | 350 = 286A B | 630 = 5A4C B
  80 = 9171 8 | 360 = 8558 B | 640 = ED0F 1
  90 = E175 B | 370 = D823 A | 650 = BE65 9
 100 = 1020 6 | 380 = ED0F B | 660 = B421 0
 110 = CCDA A | 390 = 2718 A | 670 = 5FD1 3
 120 = 8995 1 | 400 = 468A A | 680 = BFBA 1
 130 = 7AED 2 | 410 = 5823 F | 690 =  634 7
 140 = 85FD E | 420 = ED0F 6 | 700 = 50CD 2
 150 = 9098 4 | 430 = DC6C 1 | 710 = BA32 C
 160 = E859 C | 440 = ED0F E | 720 = DA5A 2
 170 = 1E24 7 | 450 = F3DE 3 | 730 = 8D61 2
 180 = 6D17 5 | 460 = ED0F 7 | 740 =  4D1 6
 190 = 2E9C A | 470 = 3BB9 0 | 750 = F586 6
 200 = 60D4 F | 480 = 903A 7 | 760 = 4F53 3
 210 = 18E6 9 | 490 = 35B0 C | 770 = CA70 5
 220 = F9B6 C | 500 = 3A95 2 | 780 = 70D8 2
 230 = 631E 0 | 510 = C97F C | 790 = 961C F
 240 =  D51 A | 520 = 47FE 5 | 800 = 3C62 4
 250 = DDF0 1 | 530 = F1F8 4 | 810 = FD55 E
 260 = F69C 8 | 540 = D532 1 | 820 = A116 A
 270 = D14F 7 | 550 = 11DA D | 830 = AF00 9
 280 = 69B3 2 | 560 = 25FA E | 840 = 7B14 5
```

```
 850 = CC87 B | 1130 =  73F 5 | 1410 = 86ED A
 860 = ED0F 5 | 1140 = 4DD4 4 | 1420 = 3610 7
 870 = 3130 A | 1150 = FC72 7 | 1430 = E268 4
 880 = B1FE A | 1160 = 9916 3 | 1440 = EBDF 9
 890 = 5F09 C | 1170 =  58E F | 1450 = A703 B
 900 = CBE3 A | 1180 = BFBA 5 | 1460 = 8A30 D
 910 = 68B3 3 | 1190 = 68D6 F | 1470 = 87B9 6
 920 = 9A7A 8 | 1200 = AE0A 9 | 1480 = E3B2 8
 930 = 3046 4 | 1210 = 5387 6 | 1490 = 7C3C D
 940 = FC1C D | 1220 = ED0F C | 1500 = 2562 D
 950 = 5BE3 B | 1230 = 7322 D | 1510 = A1DA B
 960 = 5220 C | 1240 = D0EF B | 1520 = 5F37 A
 970 = F962 6 | 1250 = 4D5F 3 | 1530 = BDF2 F
 980 = 8DD1 7 | 1260 = 6E19 9 | 1540 = E90D 2
 990 = 66F5 9 | 1270 = 5267 E | 1550 = 5C0D 8
1000 = 1010 8 | 1280 = 63A5 5 | 1560 = 82BE C
1010 = 86B2 9 | 1290 = E62D F | 1570 = 4E99 6
1020 = 2B34 A | 1300 = E95D 6 | 1580 = 95A1 9
1030 = CF56 0 | 1310 =  563 8 | 1590 =  C3B B
1040 = 1E20 0 | 1320 = 22EF F | 1600 = 7C99 A
1050 = E4C2 B | 1330 = 9665 8 | 1610 = 7922 7
1060 = BFBA 0 | 1340 = 635C 7 | 1620 = 9CB2 C
1070 =  6D2 5 | 1350 = 9CEA 5 | 1630 = 19BA C
1080 = 33DC F | 1360 = 5F2B 6 | 1640 = F3A2 3
1090 = ED0F 0 | 1370 = D5CE C | 1650 = 4C0B 1
1100 = B0D0 6 | 1380 = FC61 3 | 1660 = ED0F 2
1110 = 3BAC F | 1390 = 36A7 7 |
1120 = 4036 8 | 1400 = A1F7 B |
```

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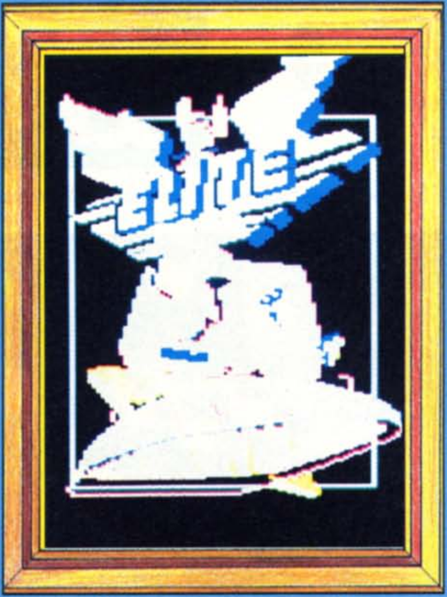
GALLERY

No. 8

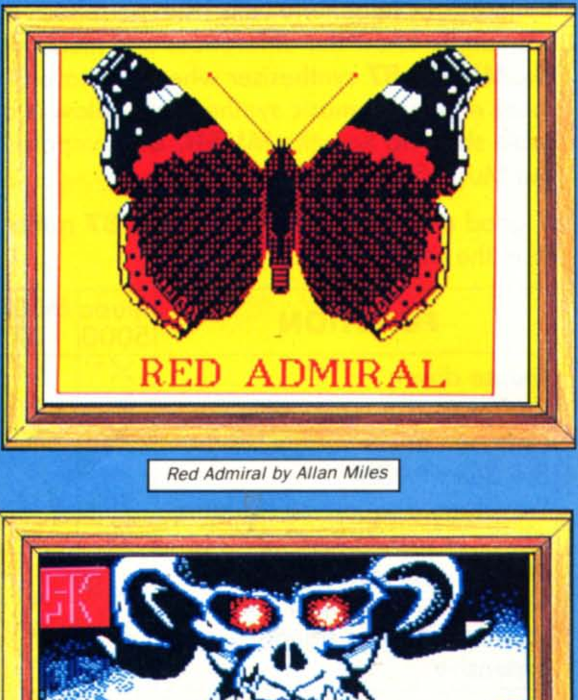
THANKS for the pictures – keep sending them in. Here are some works of art by Allan Miles, Russell Daniel, Stephen Kilbane and Fractal generator by Robert Geraghty.

We don't mind whether it's just one masterpiece or a full gallery that you send – if the pictures are good you'll see them in print. Please send screens on disc or tape and say which package they were drawn with.

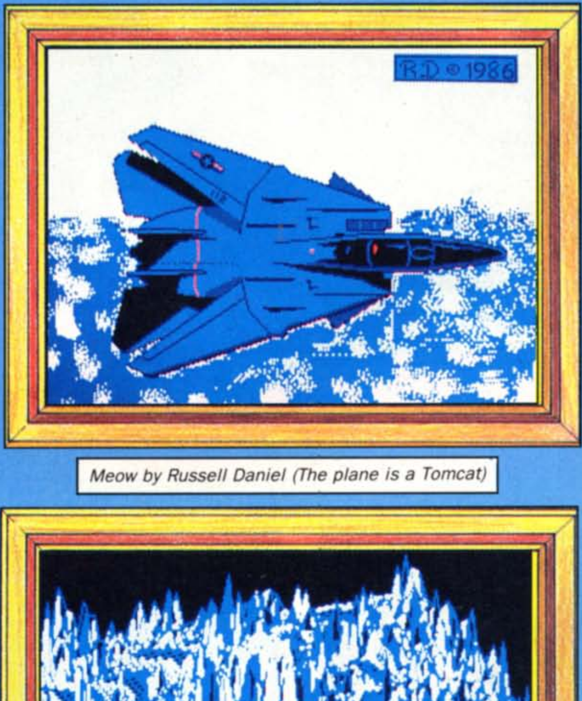
The address to send them is Gallery, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.



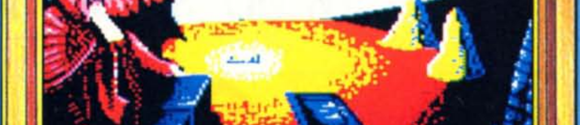
Elite by Stephen Kilbane



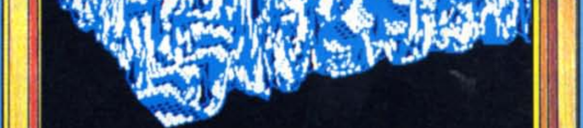
Red Admiral by Allan Miles



Meow by Russell Daniel (The plane is a Tomcat)



Druid by Stephen Kilbane



Fractal landscape by Robert Geraghty

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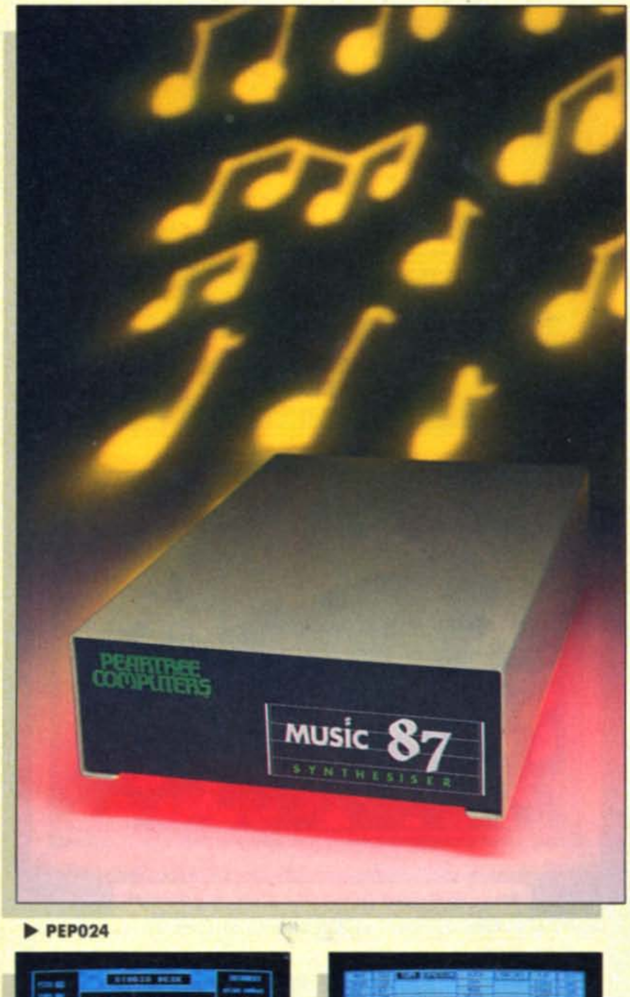


▶ **PEP024**

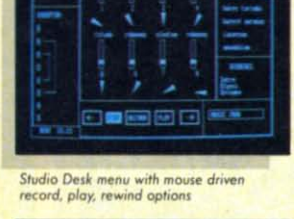
OVER 17000

visitors attended the 87 Acorn User Show. Most were amazed at the performance of the **MUSIC 87**. As a result we have been receiving hundreds of telephone calls from people wanting to know the differences and merits of the **MUSIC 87** synthesiser when compared to more expensive music synthesisers. Below is a table showing how the **MUSIC 87** compares to the Music 5000.*

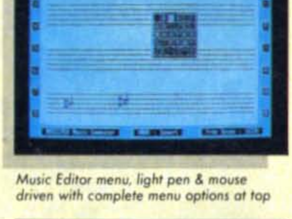
9 good reasons to buy the **MUSIC 87** rather than the Music 5000.*

FUNCTION	Music 5000	**MUSIC 87**
Mouse driven	✗	✓
2nd processor compatible	✗	✓
Light pen driven	✗	✓
Full 32k EPROM	✗	✓
Waveform designer as standard	✗	✓
Ability to bypass AMPLE	✗	✓
Graphic representation of waveforms, envelopes and score	✗	✓
Music printout as standard	✗	✓
Expensive	✓	✗

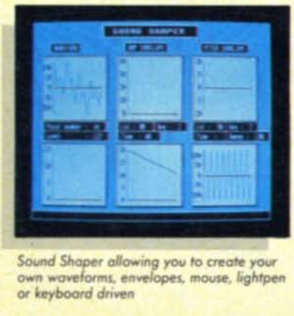
Price — Music 5000.* £161.00 — **MUSIC 87 £79.95**



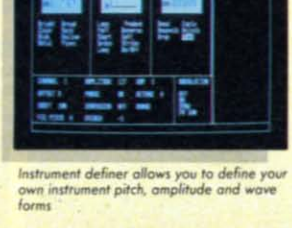
Studio Desk menu with mouse driven record, play, rewind options



Music Editor menu, light pen & mouse driven with complete menu options at top



Sound Shaper allowing you to create your own waveforms, envelopes, mouse, lightpen or keyboard driven



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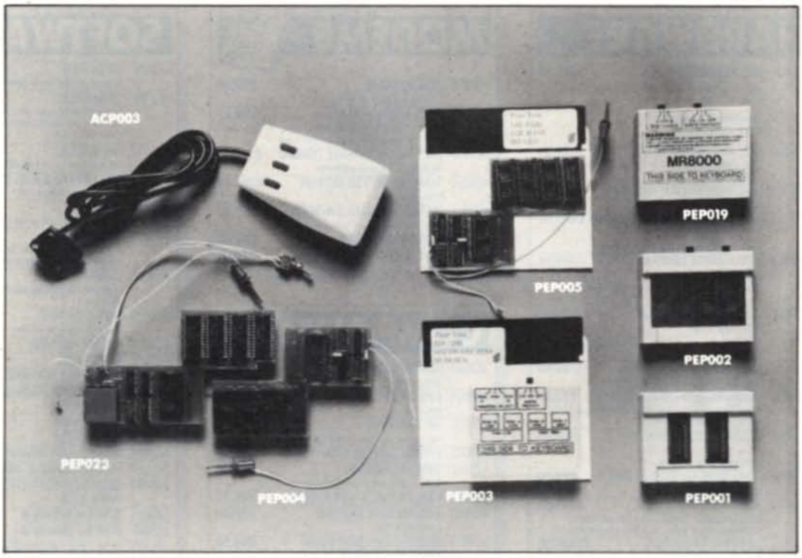

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THE 300 SERIES

The 300 Series, identified by its red function keys,

The NEW High Performance 32 Bit Risc Processor from Acorn

consists of two models, ARCHIMEDES 305 with 0.5 Mbyte of RAM and ARCHIMEDES 310 with 1 Mbyte of RAM. These machines are the latest generation of British Broadcasting Corporation Micros. They offer, at low cost, all the basic features with expansion capabilities. Both machines have a 512 Kbyte ROM and a 1 Mbyte (unformatted) 3½" disc drive.

THE 400 SERIES

The more powerful 400 Series offers considerably increased expansion capabilities. These machines are the new range of Acorn Computers.

The ARCHIMEDES 410 has 1 Mbyte of RAM; 1 Mbyte (unformatted) 3½" disc drive; a hardware floating point unit option; a co-processor bus; a hard disc controller; a four socket back plane; 512 Kbytes of ROM.

At the top of the range is ARCHIMEDES 440. This machine possesses all the features of the 410 as standard, with the adoption of 4 Mbytes of RAM and a 20 Mbyte hard disc.

ARCHIMEDES is an open system and its flexibility is achieved by fitting any of the following podules (peripheral modules) via a back plane:

- **hard disc controller (300 Series only);**
- **ROM extension board;**
- **MIDI music interface;**
- **MS-DOS co-processor;**
- **SCSI;**
- **hardware floating point unit;**
- **Ethernet podule.**

Third party suppliers will be meeting other user requirements.

300 SERIES

A305 SYSTEM	**BASIC**	£799
	MONO	£849
	COLOUR	£999
A310 SYSTEM	**BASIC**	£875
	MONO	£925
	COLOUR	£1075

400 SERIES

A410 SYSTEM	**BASIC**	£1399
	MONO	£1449
	COLOUR	£1599
A440 SYSTEM	**BASIC**	£2299
	MONO	£2349
	COLOUR	£2499

We accept Barclaycard/Visa/Access/Mastercard/postal orders or cheques. We accept government and educational orders. Leasing available, please apply for written details.

You may purchase any of the items listed, by cheque made payable to
PEARTREE COMPUTERS LTD.

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Approved service centre for all Acorn products.

Peartree House, No 1 Blackstone Road, Stukeley Meadows Industrial Estate, Huntingdon, Cambs PE18 6EF. Telephone (0480) 50595

HARDWARE

ACH001	**BBC MASTER 128** 128K complete with View, Viewsheet, basic editor ADFS 1770 DFS *** ***special offer includes FREE MUSIC 500***	**£385.00**
ACH002	**BBC MASTER COMPACT** 128K computer 640K disc drive built in RGB comp video, joystick and printer port	**£375.00**
ACH003	**BBC MASTER COMPACT TV** As above with PAL TV modulator	**£395.00**
ACH004	**BBC MASTER COMPACT MONO** As above with high resolution green monitor	**£445.00**
ACH005	**BBC MASTER COMPACT COLOUR** As above with RGB medium res colour monitor with video composite	**£545.00**
ACH011	**TURBO UPGRADE for MASTER 128** 65C102 co-processor 4MHz · 64K ram extra high Basic, high editor	**£99.00**
ACH012	**512K MSDOS for MASTER** IBM compatible DOS plus 8186 processor	**£189.00**
ACH041	**UNIVERSAL 2nd PROCESSOR** Allows both the turbo upgrade and the 512K upgrade to be run on the BBC Model B or B+	**£75.00**
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ACH016	**ADFS ROM for 1770 or BBC B+** Gives 720K per disc	**£24.00**
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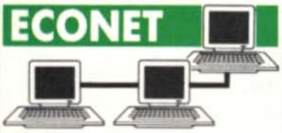
ECONET



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ACH039	**FILESTORE E01** Stand alone twin floppy file server unit Contains clock box, terminator, etc.	**£819.00**
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PLEASE USE OUR CODES WHEN ORDERING

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The Acorn Music 500

SYNTHESISER

Now available from **Peartree** the Acorn Music 500 for the BBC, BBC B+, Master 128

£49.00 excluding VAT
only from PEARTREE ▶ **ACH034**

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Computer Concepts

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ACS003	**INTER SHEET** 40, 80 and 105 column mode multiple spreadsheet	**£42.00**
ACS004	**INTER CHART** Built in Epson screen dump · Supports pie, line & bar charts	**£30.00**
ACS005	**INTER WORD** 80 or 105 column word processor · Continuous documents	**£42.00**
ACS006	**INTER BASE** Compatible with all filing systems · Card index mode, contains powerful Basic like programming language	**£50.00**
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ACS014	**VIEWSTORE** Complete with report generator Data can be imported from other view products	**£37.00**
ACS015	**VIEWSPELL** Spelling checker for View with 70,000 words	**£32.00**
ACS016	**VIEWPLOT** Enables you to draw lines, pie graphs Compatible with Viewsheet	**£24.00**
ACS017	**VIEWINDEX** Automatically creates indexes, notes, page numbers	**£13.00**
ACS018	**VIEW PRINTER DRIVER GENERATOR** Used to personalise View documents with special features	**£9.00**

SOFTWARE

ACS181	**OVERVIEW** Includes all View family software	**£86.00**
ACS181	**OVERVIEW** For the MASTER series only · Includes Viewplot, Viewstore, Viewspell, Viewindex and the View Printer Driver Generator	**£86.00**
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ACS060	**GXR for MODEL B**	**£23.00**
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ACS032	**CPMBEEB BBC/CPM**	**£14.95**
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ACS047	**THE ARTIST SOFTWARE**	**£39.00**
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MONITORS

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MON003	**MICROVITEC 1451 A/P COL MON MED** As above with audio and composite video input	**£279.00**
MON004	**MICROVITEC 1441 MON COL HIGH** Very high resolution monitor · 895 pixels · RGB interface	**£449.00**
MON005	**TAXAN SUPER VISION 625 COL HIGH** 12" super high resolution colour monitor · 4 unique text modes · Front monochrome text switch · 640 × 262 line resolution	**£349.00**
MON006	**PHILIPS CM8833 COLOUR MONITOR** 14 inch medium resolution monitor · RGBI RGB TTL	**£273.86**
MON007	**PHILIPS CM8852 COLOUR MONITOR** 14 inch medium/high resolution · RGBI RGB	**£299.00**

MONOCHROME

MON009	**KAGA KX 117 GREEN MONITOR** P31	**£89.00**
MON010	**KAGA KX 118 GREEN MONITOR** Clarity exceptional on BBC text	**£99.00**
MON011	**KAGA KX 119 AMBER MONITOR** (PUL)	**£99.00**
MON012	**PHILIPS GREEN MONITOR**	**£79.00**

Many other monitors are in stock. We can supply, please call for prices and deliveries.

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PRT001	**EPSON LX86 PRINTER** 120CPS · NLQ mode · Centronics Interface	**£199.00**
PRT002	**EPSON FX800** 19 pin dot matrix · 180 CPS draft mode, 35 CPS NLQ mode · 8K buffer · Parallel interface standard · 80 column	**£399.00**
PRT003	**EPSON FX1000** 19 pin dot matrix · 200 CPS draft mode, 35 CPS NLQ mode · 8K buffer · Parallel interface standard · 136 column	**£499.00**
PRT004	**EPSON LQ800 PRINTER** 24 pin dot mtrix · 180 CPS draft mode, 60 CPS NLQ mode · 7K buffer · Parallel interface standard · 80 column	**£499.00**
PRT005	**EPSON LQ1000 PRINTER** 24 pin dot matrix · 180 CPS draft mode, 60 CPS NLQ mode · 7K buffer · Parallel interface standard · 136 column	**£699.00**
PRT008	**MP 165 PRINTER** 165 CPS draft mode, 40 CPS NLQ mode · 2K buffer · Centronics interface · Built in tractor feed · Epson compatible	**£199.00**
PRT011	**JUKI 6100 PRINTER** 18 CPS daisy wheel printer · Standard ribbons · Centronics interface	**£299.00**
PRT021	**PANASONIC KX-P1081 DOT MATRIX PRINTER** Fast draft printing at 120 CPS Excellent Near Letter Quality font at 24 CPS	**£147.00**
PRT014	**EPSON LX TRACTOR FEED**	**£22.00**
PRT016	**EPSON LX CUT SHEET FEEDER**	**£59.95**
PRT023	**EPSON LQ1000 TRACTOR FEED**	**£50.00**
PRT024	**EPSON LQ1000 CUT SHEET FEEDER**	**£130.00**
PRT025	**EPSON FX80+ CUT SHEET FEEDER**	**£129.95**

**Please Note
We have many other makes of printers in stock such as

brother.

Always call for availability.

LEADS

LDS001	**BBC TO TV LEAD**	**£1.25**
LDS002	**BBC TO GREEN MONITOR LEAD**	**£2.95**
LDS003	**BBC TO SONY/KAGA COLOUR MONITOR**	**£5.95**
LDS004	**BBC TO MICROVITEC LEAD**	**£2.20**
LDS005	**PHONO TO PHONO LEAD**	**£1.25**
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LDS009	**BBC TO CENTRONICS**	**£9.95**
LDS010	**BBC TO SERIAL PRINTER**	**£9.95**
LDS011	**4 WAY MAINS TRAILING SOCKET**	**£9.50**
LDS012	**CABLE FOR MODEM**	**£4.95**
LDS014	**MASTER COMPACT PRINTER LEAD**	**£15.95**

BOOKS

MIS012	**BBC MASTER REFERENCE GUIDE PT1**	**£14.95**
MIS013	**BBC MASTER REFERENCE GUIDE PT2**	**£14.95**
MIS014	**VIEW MANUAL (BBC)**	**£10.00**
MIS015	**VIEWSHEET MANUAL**	**£10.00**
MIS019	**VIEWSTORE MANUAL**	**£10.00**
MIS016	**DFS OPERATING SYSTEM MANUAL**	**£6.95**
MIS017	**BBC USER GUIDE**	**£14.95**
MIS024	**BBC ADVANCED USER GUIDE**	**£16.95**
MIS018	**ADVANCED SIDEWAYS RAM USER GUIDE**	**£9.95**

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MIS005	**RIBBON FOR MX FX80 & JUKI 5510**	**£4.50**
MIS006	**RIBBON FOR LX80 LX86**	**£4.50**
MIS007	**RIBBON FOR MP165**	**£5.00**
MIS008	**RIBBON KAGA KP810/ CANON PW1**	**£5.95**
MIS009	**RIBBON FOR EPSON FX RX/100**	**£7.95**
MIS034	**RIBBON FOR EPSON LQ800**	**£11.95**
MIS023	**RIBBON FOR CPA80**	**£3.50**

All prices are exclusive of VAT.

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OVER £500 IN PRIZES

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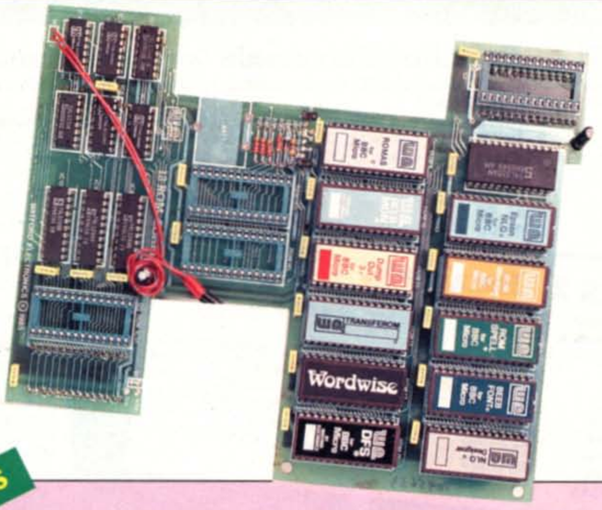

Watford Electronics has grown over the years to become a major force in the BBC Micro market. This year Watford celebrates its 15th birthday and is asking you to help celebrate the occasion in style.

To this end we have devised an exciting Birthday Competition.

THE PRIZES

1st worth £350

The Solderless Sideways Rom Socket Board – designed to slot straight into your BBC Micro with ease. And to make the prize even better Watford has filled 11 of the 16 sockets with roms. Here's what's been included:

- Epson NLQ
- Rom Manager
- Rom Spell
- Beeb Font
- NLQ Designer
- Romas
- Beebmon
- Dump Out 3
- Wordwise Plus
- Transferom
- Watford DFS

2nd worth £121

Rom/Ram Card with 128k ram PLUS RomSpell

3rd worth £36

Watford Solderless Sideways Rom Socket Board

To add that extra special touch, the three winners will receive free tickets to the 17th Micro User Show where they will be presented with their prizes by Watford Electronics and have their pictures taken for posterity.

WHAT YOU HAVE TO DO

Simply answer the following questions and return them to The Micro User by November 7. The winners will be the first three correct entries pulled from the bag.

QUESTIONS

1. **Who is managing director of Watford Electronics?**
2. **Who is the author of Wordwise Plus?**
3. **What does ZIF stand for?**
4. **Which dates does the sign of the ram fall between?**

ANSWERS

1 ____________________

2 ____________________

3 ____________________

4 ____________________

Name ____________________

Address ____________________

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Send to: **Watford Birthday Competition, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.**

Cut Price Disks from Direct Disk Supplies

from only £10.99 for 20 disks delivered to your door.

Cash 'n Carry prices on disks from Direct Disk Supplies

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The Premium Universal disk tested to DSDD 96tpi – suitable for all drives needing high quality media. (SSDD, DSDD 40/80 track)

25 disks	£ 14.99
50 disks	£ 27.99
100 disks	£ 49.99
200 disks	£ 96.99
250 disks	£119.99
500 disks	£229.99
1000 disks	£399.99

Packed in 25's, complete with envelopes, labels, WP tabs and hub-rings. Disks individually certified and tested (on both sides) to 96tpi means no problems and higher reliability. Lifetime Warranty.

ALL PRICES INCLUDE VAT & DELIVERY TO YOUR DOOR! NO HIDDEN EXTRAS

OFFER 2 Rainbows

Sets of 5 colours in each pack. Universal coloured disks to code your files and programs. Without doubt the best value coloured disks on the market. (SSDD, DSDD 40/80 track)

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250 disks	£149.99
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1000 disks	£499.99

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OFFER 3 Flippies

This is the disk for turning!
Reversible disk tested both sides. 2 notches and 2 index holes. Ideal for BBC, APPLE, Commodore etc.

25 disks	£ 18.99
50 disks	£ 35.99
100 disks	£ 69.99
200 disks	£129.99
250 disks	£149.99
500 disks	£279.99
1000 disks	£499.99

Packed in 25's, complete with envelopes, labels, WP tabs and hub-rings. Disks individually certified and tested (on both sides) to 96tpi means no problems and higher reliability. Lifetime Warranty.

OFFER 4 HIgrade Doubles & PC Preformatted

	HIgrade Doubles	PC Formatted
25 disks	£ 12.99	£ 18.99
50 disks	£ 23.99	£ 35.99
100 disks	£ 45.99	£ 69.99
200 disks	£ 89.99	£129.99
250 disks	£105.99	£149.99
500 disks	£199.99	£279.99
1000 disks	£359.99	£499.99

Premium quality, individually certified to DS 48tpi. Made for the PC, giving premium quality at budget prices.

Why not spoil yourself, and buy them formatted – a little extra saves a lot! There's never a disk formatted when you need it.

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	Price per order qty.	Approx price per disk ex-VAT (infor only)
20 disks	£ 10.99	.48
40 disks	£ 19.99	.44
60 disks	£ 28.99	.42
80 disks	£ 36.99	.40
100 disks	£ 42.99	.38
200 disks	£ 82.99	.36
500 disks	£199.99	.35
1000 disks	£389.99	.34

Branded SCOTCH (made by 3M) SSDD 48tpi at prices below other people's plain label. Certified error free and tested by 3M; disks have hub-rings, tyvek envelopes and labels.

Stocks are decreasing rapidly, these have been extremely popular.

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NEW LOWER PRICES

Qty	SS	DD
10	£ 13.99	£ 15.99
20	£ 26.99	£ 29.99
50	£ 64.99	£ 73.99
100	£119.99	£ 139.99
200	£229.99	£ 269.99
250	£279.99	£ 329.99
400	£429.99	£ 519.99
500	£499.99	£ 599.99
1000	£949.99	£1099.99

3.5" disks in plastic library boxes.

Made by a leading manufacturer, all our disks are individually certified to 135tpi.

Don't forget the price includes VAT, delivery and library boxes!

OFFER 7 3M & Verbatim

5.25" disks 3M/Verb

SSDD 48tpi	744/525	20 disks	£25.99
DSDD 48tpi	745/550	20 disks	£29.99
DSDD 96tpi	747/557	20 disks	£37.99
DSHD 96tpi	799/HD	20 disks	£49.99

3.5" disks

SSDD 135tpi	20 disks	£39.99
DSDD 135tpi	20 disks	£49.99
DSDD High Density	10 disks	£49.99

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Brand Leaders at Cash 'n Carry prices

If these are your favourite, then don't miss our CRAZY low prices for 20 disks. Remember there's no extras, just terrific value.

Same day despatch – at no extra cost

OFFER 8 HI-flyers

PC-AT High Density Disks made by one of our major manufacturers. Suitable for PC-AT and other High Density drives. Lifetime warranty.

Total price (no extras)

20 disks	£ 32.99
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80 disks	£119.99
100 disks	£139.99
200 disks	£259.99
500 disks	£599.99

OFFER 9 3" CF2 disks

Maxell or Panasonic 3" CF2 disks

10 disks	£ 25.99
20 disks	£ 49.99
50 disks	£109.99
100 disks	£209.00

VAT & carriage included.

OFFER 10 Box Clever

Safe! Clean! Tidy!

Sixers – 6 stylish plastic library cases for 10 disks. VAT & carriage included.

3.5"	Slimpak	£8.99
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Lockable Boxes

3.5"	TDS040	40/50 disk box	£ 9.99
	TDS080	80/90 disk box	£12.99
5.25"	TDS050	50 disk box	£ 9.99
	TDS100	100 disk box	£12.99
IBM parallel printer cable			£9.99

How to order

1. DIAL-A-DISK ON 01-979 7811, and give your ACCESS or VISA number and expiry date.
2. Send your cheque etc. to Direct Disk Supplies Ltd.
3. Official Orders, Bona-fide orders from Universities, Colleges, Schools, Charities, etc are very welcome.
4. Cash orders, no minimum value. Account orders, minimum value £50.

VISA Access

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01-979 7811

Direct Disk Supplies Ltd.

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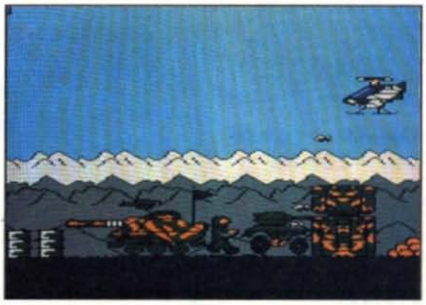
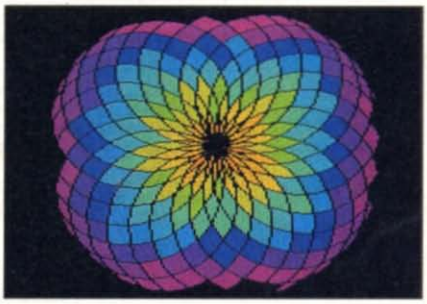
Rings around Mode 2

Ian Waugh finds out how to get more colour from your micro



Stryker's Run (with new colours)



Pattern showing new colours

THERE are probably 101 reasons why you bought a BBC Micro but it is unlikely to be because of the fantastic range of on-board colours. The graphic facilities are good but eight colours is hardly generous. So if you want more hues and tints than just primary and complementary colours what do you do?

The simple answer is to buy an Archimedes (I'm saving) but if your budget doesn't stretch that far you may be interested in the SPX system – or Saturn Palette Extension to give it its full title.

This is a plug-in board which fits inside your BBC Micro and gives access to 4096 colours. The actual number of colours you can have on screen at any one time is still determined by the mode, for example in Mode 2 you can have 16 colours and none of them need flash.

There are two SPX boards to accommodate BBC B and Master computers. The BBC B board plugs quite simply into the Video ULA chip. In the Master this chip is soldered in and instead the board plugs into Rom socket 8. The fitting instructions are clear but you must accept certain restrictions. For example, it fits over IC38 (where my write protect switch used to fit) and a flying lead plugs into the Econet board connector. A couple of DIL sockets on flying leads clip over a couple of other ICs, too.

You also need a monitor with linear RGB inputs. This includes nearly all modern monitors although Microvitecs (and some others) only have digital RGB inputs and require internal link changes for use with the SPX system. Saturn Computers will advise and supply correct connectors for your system.

SPX works by mixing red, green and blue in various intensities, from 0 to 15, giving you 16 x 16 x 16 or 4096 colours. The *SETCOL command is used like this:

```
*SETCOL 28 (15,1,0)
```

This would set colour 28 to dark orange. To get you started, 32 colours have already been defined and can be set by name, for example:

```
*SETCOL 28 DARKORANGE
```

The *SPREAD command mixes two colours and sets the colours in between to shades of the mixed colour. This helps you to choose the exact shade of a colour you require.

VDU19 can be used, too, and commands can be used from machine code via OSWRCH. The *ON command intercepts VDU19 calls and the following line performs the same function as the examples above:

```
VDU19,28,DARKORANGE,0,0,0
```

You can also specify the RGB intensities from VDU19.

If a program lets you use * commands, you'll be able to use the SPX software. Protected programs and programs which don't give you access to * commands can have colours set prior to loading.

A set of 16 colours is called a palette or map and you can define up to seven of them with *SPXMAP. *SETCOL can be used to set colours in several maps at once. In this example:

```
*SETCOL 1 PINK//KHAKI/
```

colour 1 is set to pink when maps 0, 1 and 2 are shown and to khaki when maps 3 and 4 are shown. *FLASH is used to set the length of time a map will be displayed on screen. The colours must be set up first as shown above and you can create some very clever effects with this switching method. The manual uses a simple traffic light display as an example.

There are other commands to let you cycle through the colours and list the palettes.

The only major restriction in the system regards changing the colour black. It may not be possible or it may have unpredictable effects – and it does, especially in Mode 7.

Software and hardware should be available soon to provide four palettes of four colours which can be switched at the end of a single line scan giving four colours in Mode 0 and 3. It is expected to cost around £20.

I have been using the Master version of the board for several weeks and the software works very well indeed. The display is slightly duller than that provided by the micro's own RGB output and this may vary from monitor to monitor.

Also, after the computer had been on for several hours, the colours would

Turn to Page 135 ▶

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***MASTER REPLAY (Self-contained) – £41.95**
***MASTER REPLAY (Add-on) – £36.95**

The MASTER to 'B' conversion kit enables most BBC 'B' tapes to be used and transferred to disc on the Master (M/REPLAY must be present).
MASTER/B conversion kit – £14.95, (state which M/REPLAY).
Use the ROMBOARD '3' to overlay up to three extra ROMs in place of the unused built-in ROM software. Optional switches (extra) can be used to change over as required.

***ROMBOARD '3' – £19.95.**
Switches:1–£2.00, 3–£4.00

*IMPORTANT – Because all the above products require the 1Mbit ROM (IC24) to be extracted please ensure that this ROM is not soldered into the baseboard.

NEW ROMBOARD '4' may be used instead of, or in addition to, ROMBOARD '3'. Up to four new ROMs can be supported, 'over-laying' the RAM banks or cartridge slots, various combinations may also be set by links. This board incorporates a built-in read/write-protect switch for the RAM banks.

ROMBOARD '4' – £29.95

Independent write-protect switch for one or both RAM banks.

WRITE-PROTECT SWITCH – £8.95

BBC 'B' and 'B+'

The REPLAY System for tape to disc transfer is still the market leader. Easy-to-use routines allow the saving of memory to disc. Extra features allow a screen display to be printed through a suitable printing program, there is a pause facility and mid-play stop and save. Anti-piracy encoding restricts discs to personal use. Versions available to suit all popular disc interfaces.

BBC REPLAY – £35.00

(Please state which disc interface is fitted).

The B+ to B conversion kit expands the number of tape programs available to the B+ user. A board carrying the O.S.1.20 ROM is plugged into the computer and a switch allows selection of normal or 'B' mode.

'B+ to B' Conversion – £25.95, or without O.S. ROM – £15.95

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dither a little and sometimes a colour would break into two, a strange effect – interesting but odd – but easily settled by resetting the colour with *SETCOL.

There's no doubt that the SPX board is great fun and with a little ingenuity the palette switching effects could be used to produce some amazing animated displays. The tragedy is the results can only be displayed on another computer with an SPX board so you can't even send your creations in to our Gallery pages.

If you are an artist or have felt the acute limitations of the BBC Micro's eight colours, the Saturn Palette Extension could put a little more life into your screen displays. It's either that or an Archimedes.

Ian Waugh

Product: Saturn Palette Extension Board
Supplier: Saturn Computers, Flat 1, 12 Avenue Road, Darlaston, W. Midlands, WS10 8AR.
Tel: 021 526 6216.
Price: Model B £63.19; Master £68.94.

STATUS COMMANDS

***DIE**	SPX system off and prevent colour changes after break
***ON**	Intercept VDU19, VDU20 and Mode changes
***OFF**	VDU intercept off
***SPXLIST**	List currently displayed map

COLOUR SETTING COMMANDS

***CYCLE**	Rotate part or all of the colour palette
***RECYCLE**	Rotate palette in opposite direction to *CYCLE
***SETCOL**	Set logical colour to named colour
***SPREAD**	Mix and display two colours

MULTIPLE MAP COMMANDS

***FLASH**	Set duration of display of each map
***SPXMAP**	Select map for use with *SPREAD, *CYCLE and VDU19 commands
***SETCOL**	Set colours in several maps at once.
***SPXSHOW**	Display map

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```
 1120 ENDPROC
 1130 DEFPROCmen
 1140 ONpl%-1GOTO1150,1160,1170,1180,119
0,1200 ELSE1200
 1150 !U%=&70A0707:U%!4=&7080707:ENDPROC
 1160 !U%=&708070A:U%!4=&70A0708:ENDPROC
 1170 !U%=&7080C08:U%!4=&C080C07:ENDPROC
 1180 !U%=&80C100A:U%!4=&80C0107:ENDPROC
 1190 !U%=&C0A0C10:U%!4=&8100C0E:ENDPROC
 1200 !U%=&E0C100E:U%!4=&8100E0E:ENDPROC
 1210 DEFPROCset
 1220 F%=0:N%=4:C%=0:S%=0:X%=17:Y%=128
 1230 Z%=X%:h%=TRUE:?&81=0:?&99=&FC
 1240 ?&9A=1-(pl%<4):?&9B=140-pl%*16
 1250 sm%=TRUE:COLOUR3
 1260 PRINTTAB(0,2);pl%-1TAB(19,2);li%
 1270 COLOUR1:PRINTTAB(0,6)"*"TAB(19,6)"
*"
 1280 IFL%=0:CALL&E00:ELSECALLO%
 1290 T=-2:H%=0:S%=0:?&80=T:CALLQ%
 1300 ENDPROC
 1310 DEFPROCinit
 1320 DIMC(20),S(20):hsn%=&1700
 1330 hs%=&1800:I%=0:s%=0
 1340 FORT=.1TO2*PI+.1 STEPPI/10:C(I%)=C
OST:S(I%)=SINT:I%=I%+1:NEXT
 1350 ENDPROC
 1360 DEFPROChisc:PROChead
 1370 PROCmup:PROCbel(60)
 1380 PRINTTAB(0,4)FNlines:FORT%=0TO11
 1390 PRINTTAB(37,6+T%)CHR$156TAB(2,6+T%
)CHR$129CHR$157CHR$135;:IFT%MOD11PRINT$(
hsn%+T%*20-20)STRING$(30-LEN$(hsn%+T%*20
-20)-LENSTR$hs%!(T%*4-4),".");hs%!(T%*4-
4);SPC2
 1400 NEXT:PRINT''FNlines
 1410 IFI%<>TRUE PROCgname
 1420 PROCbel(120):TIME=0
 1430 PRINTTAB(6,22)CHR$136"PRESS THE SP
ACE BAR TO PLAY"
 1440 REPEAT:IFTIME=100CALL&900
 1450 UNTILINKEY-99
 1460 *FX13
 1470 PROCbel(100):PROCmode(2)
 1480 li%=5:pl%=2:s%=0
 1490 ENDPROC
 1500 DEFPROCbel(N%):LOCALT%
 1510 FORT%=1TO3:SOUND1,2,N%,4:NEXT
 1520 ENDPROC
 1530 DEFPROChead:PROCmode(7)
 1540 FORT%=0TO1:PRINTTAB(10,T%)CHR$141C
HR$132CHR$157CHR$135"DUNE HUNTER  "CHR$1
56:NEXT
 1550 PRINTTAB(13,2)CHR$131"By: G.J.Key"
 1560 ENDPROC
 1570 DEFPROCmup
 1580 IFs%<=hs%!36:I%=TRUE:ENDPROC
 1590 I%=10:REPEAT:i%=(I%-1)*4:is%=(I%-1
)*20+hsn%:IFhs%!i%<s%:hs%!(i%+4)=hs%!i%:
$is%=$(is%-20):I%=I%-1
 1600 UNTILI%=0ORhs%!(i%+(I%<>FALSE)*4)>
=s%
 1610 hs%!i%=s%:$is%=STRING$(19,".")
 1620 ENDPROC
 1630 DEFPROCgname
 1640 PROCbel(160):PRINTTAB(8,22)CHR$136
"PLEASE ENTER YOUR NAME"
 1650 T%=0:$&380=$is%
 1660 PRINTTAB(4,7+I%)CHR$131;:*FX21
 1670 REPEAT:i%=GET:IFi%=13$is%=$&380:UN
TILTRUE:PRINTTAB(4,7+I%)CHR$135:ENDPROC:
ELSEIFi%<32ORi%>127UNTILFALSE
 1680 IFT%<19ANDi%<>127VDUi%:T%?&380=i%:
T%=T%+1
 1690 IFT%>0ANDi%=127VDU8,46,8:T%=T%-1:I
FT%<>10T%?&380=46
 1700 UNTILFALSE
 1710 ENDPROC
 1720 DEFFNlines:=CHR$146+STRING$(38,CHR
$243)
 1730 DEFPROCmode(M%)
 1740 VDU22,M%,23;8202;0;0;0;0;
 1750 ENDPROC
 1760 DATA81,2,81,2,97,4,97,4,97,4,101,4
,109,2,101,2,97,2,89,2,81,2,73,2,60,2,81
,2,97,4,97,4,97,4,101,2,97,2,81,2,73,2,7
3,2,0,0
 1770 THEEND
 1780 DEFPROCcode
 1790 FORT%=0TO&2F:T%?&70=0:NEXT
 1800 Q%=&E40:O%=&E1D:J%=&120D:E%=&11EF
 1810 G%=&15EC:V%=&14DB:H%=0:U%=&10CC
 1820 K%=&13D0:?&7D=7
 1830 $&1800=STRING$(200,CHR$32)
 1840 P%=&E00:RESTORE2280
 1850 REPEAT:READS$:PROCreadto(S$)
 1860 UNTILP%>&1594
 1870 !&88=&01FF01FF:!&8C=&01FF01FF
 1880 $(&1593)=STRING$(88,CHR$0)
 1890 hs%=&1800:FORT%=0TO9:READ$(&1700+T
%*20):hs%!(T%*4)=10000-T%*750:NEXT
 1900 ENDPROC
 1910 DEFPROCreadto(S$)
 1920 FORX%=0TO6:A%=0:FORT%=1TO4
 1930 A%=A%+FNdec(MID$(S$,T%+X%*4,1))*64
^(4-T%)
 1940 NEXT:!P%=A%:P%=P%+3:NEXT
 1950 ENDPROC
 1960 DEFFNdec(a$)
 1970 IFa$<":"THEN=VALa$
 1980 IFa$<"["THEN=ASCa$-53
 1990 =ASCa$-59
 2000 REMmusic
 2010 DATAcU2dhNo@4Ac9eLXu88oo2OY20W6B
 2020 DATA3eZMx23ciCvz?m09iCs9?m09iCs9
 2030 DATA1uY9c@WWwIk9G0XzWYWM1SYsmJwk
 2040 DATAKv03eUec2OOx2KaB2Omx2MKBdfrc
 2050 DATAOco9f@o9Vco9hPY96?c9aE5djEap
 2060 DATAmEc41h3z2P?t2K5Ai8n8GYU9GYd?
 2070 DATAe0DEeUHk2QGx2PmB2O?t2PeB3mZc
 2080 DATAx@qejco9?m09e6U9M2Vc0EE02UE2
 2090 DATAlkdX2QE?t0b440I95kk?004FXE04
 2100 DATA00800000NK40SLJhXMa1cNqJiP6d
 2110 DATA0AL100000000000000000000006FIB
 2120 DATA@GYVEHopKJ59PKJR0U5p1UE340k8
 2130 DATAA20M000B0k001kQ7EoA6QrBnML61
 2140 DATAcsBlIrCHMrK3QoB3ULBnQK5lMrC3
 2150 DATAApB3QkB5EoBXEqBnMrB3YuC3QsCJ
 2160 DATAEoBXEqBnMrCnMsBnEoBqYrBnMrCK
 2170 DATAcsC3Z8CaMrC1EpBnEmAnRaAHEoDz
 2180 DATAQrBnML61csBlIrCH0rNX0rA3MkBn
 2190 DATA0sA3UkBnEqBp0rA3MkBnNLC30oJJ
 2200 DATAEqBnMrB3QoB3csBXUtKHEqBnMrB3
 2210 DATAQvB3UrBXErNXEoAXEoN3MqB3EoN3
 2220 DATAIq54AmAX8lAHAlAX0zwahgL5kwDH
 2230 DATAZdD30wA3YkBn0tA3UkBHUtM3ZJJp
 2240 DATANJB3MvD50kAX0wCnkvA38kI30tMn
 2250 DATAIoA3gkA3ZJD3YtOJsyD3kwP3wzDn
 2260 DATAgvPHsy6okwDXkuCHYvD30DyKOoZu
 2270 REMsprites
 2280 DATAVNeZ0OZwcbW5S?I74w2R86YMjLW5
 2290 DATAbFDMmVDEcioE3vo7ztoIvtoH4AcH
 2300 DATA0?@oVIydUeK24jYU48@6?G3ra4kG
 2310 DATAmysCU?IEvV3EeEFYPMo0PcoHPsoH
 2320 DATA4j0HGE8EXEfzeFBiPMrs2eYH4qyB
 2330 DATAXE2d80EUfFAlmEFY0f0vmHmd0d3W
 2340 DATAXS6deEFYx20HReLz87K5dF6QPFW0
 2350 DATAXEFcfEFcdUFU7T2014miVbK62x1q
 2360 DATAY1@9MAsEUAM4mEbE1P0q163iVM3a
 2370 DATAN?pnR8I44jSh4fOB4jWh4fSB4NkU
 2380 DATAXSedXF?qeF?rZMI011WinbbkmUEM
 2390 DATAVH3k0eaI4n4U14mhlUPk0?aItUHk
 2400 DATA1uaINFV8YMJn1oZcO6oMZsI467GZ
 2410 DATAVEFd0?aGdNO5dIVoR8KGVN6Z???E
 2420 DATAVU2U6?qH1z04C9SZVNHZY?KLZ6IM
 2430 DATAmFTk4v1D8925gF6v0z1k4IQULNCa
 2440 DATAYFJPtAdknx2KR8Jco9baz?YHcda5
 2450 DATAjFU7TFDjbFELmVDzcjAEm@o72AYH
 2460 DATA80OEH13IjEyZC1Dje53dxvoMW7IH
 2470 DATA50SRqEVdY1Lgzu04mMWI1@1UZ06U
 2480 DATAJ228zvoF7toH1voI?9oIo@oIs9oH
 2490 DATAJ20HZOIFjGzkmFDE?907122BC9?Z
 2500 DATA4zTxg0X9vvoPzoYH?aYMZyIsg0X9
 2510 DATA1eYA4x2RVE6dAG2J4AcHTAO24WYU
 2520 DATAVM6ZV8K3dESW2B1w4w3S80DEjF2A
 2530 DATAbFDzjFDjbFE7jFDrw1DE1wY7C0Ck
 2540 DATAbE7dbFD8mVDE8BAEdF8d1B1wVNeZ
 2550 DATAUOJwU6IMVM65ViW5Hua0dM?5V?O2
 2560 DATA4jYUdMG6VOO24jYUlcK6uV22eEGW
 2570 DATA38o0VUM410ki?cM6xR3?10kB10mB
 2580 DATAX02UcUEko@o71wYHm06ExF3?132A
 2590 DATAauJU4w2R4x2xo0n94?Y4mGbE1B07
 2600 DATAo0Wd2AYVeEHE6R0?o1393eY4mF7E
 2610 DATA1B0Co0mdmuo91mYEn@aco9oEzIkH
 2620 DATA1ycE30c81l0C3AY8g2LkuHUuRsI7
 2630 DATA16WhOTx9jOUd81DzbF4WjFDzf1Dr
 2640 DATA80FYbF4WM1E74yyx0KYM4zyRICYs
 2650 DATAv@acuHUJ1to6mK0I1D0Co0Gd1?b3
 2660 DATAo7S5S8HCY7X5tHU4661rM7RZ16Wh
 2670 DATA6Dx9XGZddFEbA8po2?8IH0SUfV5P
 2680 DATAw0EMYuM7ZcP?M9L64y2xGY@k4eac
 2690 DATAzysU80CdaDzizysU81adeTzivW15
 2700 DATA0?bzjL252VET2b0aOL0a80W0?Dzi
 2710 DATAOL2ZvW00?@rzzoYIzysU80CdMDzi
 2720 DATA4H0UjLKaXFDdjF?tXFDgeF?ua8I8
 2730 DATA87CZcV6vb4l00?8GV02U9Udl9Udl
 2740 DATA9UdlQ8Jl?LGpQ0I7hL25GYdo6?V?
 2750 DATA4s2tVL1Zc@ZkQKIHc7658600eF4k
 2760 DATA?8ryROMG4yax4UKB4ymx4UOBjI2W
 2770 DATAbQ00mVKfcjTEcG02E?8F5Oix4WUh
 2780 DATA5OiRxB3?4WUCH0?WuV6VVUSWBW1z
 2790 DATATuMGxV3?vvpUNFUHHAa3H0CEc1@g
 2800 DATAQME0QGM?QGM?QGM?jL25?FDrQ0I7
 2810 DATAjL25GVDre4d?U@YMQ6IHiL25NFCU
 2820 DATAQMJljE2UGVD81C2ew0iE1?Y4eE@E
 2830 DATAAG03CfoHa8II54Cx4faB54mx4feB
 2840 DATA536xQ?KeVEQdQ?JyVTUdSMJkVL6Z
 2850 DATATeFuVNWZSP5vLSfeYN00wAdtlgUg
 2860 DATA4x1vQ?IMVEVdSMJkOL6ZQMI0o7e5
 2870 DATA99XKpx1x67aZVLVdSeJtVE9dmB1u
 2880 DATAVsJUVMM5VuK6oA7E0?0p2b642b4a
 2890 DATA2b4aVL4av@pk1mYJVL05v@pkGYcJ
 2900 DATA6?V?4s2tVL1Zc@ZkQKIHc765gSU0
 2910 DATA34ZkM72F4q?C4qCAw?cM0?Y7mUFd
 2920 DATAOTjEc?c3P@o6N9YHWAcHxF28c6GW
 2930 DATA1uYHzz4U4q?i4qCguidU00000000
 2940 DATA4U0000001U4E0V4?4k6K0Tc3ZUAH
 2950 DATAU0010800U0200800U0200800U020
 2960 DATA0800U0200800U020BH8kD3crF44z
 2970 DATAGpZ6Ip1CKZVJMZxROKRYQKtgS7Nn
 2980 DATA07pv0000000030k020Q71kQA1kkA
 2990 DATA30U71kQ71kQ71kQ8000700000000
 3000 DATA6xg15FGfIB0Js?20g91UQ92UW7?0
 3010 DATAo7Woc81EY63UY?2kQc1kS@G8U53E
 3020 DATAMC2Uzv2E0U41zk83003y00000000
```

This is one of hundreds of programs available FREE for downloading on

MicroLink

In addition to these many BBC Micro programs in the MicroLink library will also run on the Electron.

◀ From Page 137

```
 3030 DATA000000000000061U061UM0EMM20U8
 3040 DATA1UU80EM4Mt84etBvWMD351K?51EI
 3050 DATA5FII1u8J4JEUbE2dmVDUMDIE0U03
 3060 DATA0U8e008e0k000kwD00000FI10FI1
 3070 DATA3kI05lQ?1Ew?0k0z0kwD2Xw0?kID
 3080 DATA3kIf00k?10k88XAA0kk030kA33AA
 3090 DATA30E0Akk8028F0UA2aE002FQ3NU0A
 3100 DATA1Wg3014A0EA1200030UA3Cc00UUD
 3110 DATA10w630Y13Cc030E00004?3kU0000
 3120 DATAC20003MwC000?HkK03AwA3k0D2Yw
 3130 DATA000tD30w5Xkd0E00D0Ak0UA36U00
 3140 DATA0kg@0n0300000E0000A300000k80
 3150 DATA9E030kQ70n030n020kAwD0015Xkk
 3160 DATA02YwA3k0D1Mw000qD30oAnkK0000
 3170 DATAD3EE000t000053kE0000C00U5F0s
 3180 DATA83UU51EUB2cU?XUy41EI5E0cA2Us
 3190 DATA5FEeDXscDk00C3wyB3EzD3kozCYw
 3200 DATAzBPKuSbw20rwEF58MolHOKljIXdn
 3210 DATASPOCK,JAMES.T.KIRK,SCOTTY,FORD
 PREFECT,BONES,HAL,BLAKE,DR. WHO,SMORF,O
PERATING ARTHUR
 3220 DEFPROCp(A$,B$)
 3230 PRINTSPC(7)CHR$131A$G$STRING$(10-L
ENA$,".")CHR$134B$
 3240 ENDPROC
 3250 DEFPROCshorten
 3260 *TAPE
 3270 ENVELOPE1,3,126,0,0,0,0,0,0,-2,-2,
-2,126,0
 3280 ENVELOPE2,1,126,-6,6,-6,0,0,126,-2
,-2,-3,126,0
 3290 ENVELOPE3,0,2,2,3,1,1,1,126,-1,-6,
-6,126,0
 3300 ENVELOPE4,2,0,0,0,0,0,0,126,-4,0,-
1,126,0
 3310 PROCrelocate:*FX15
 3320 IF(!&220  AND&FFFF)<>&934:P%=&900:
RESTORE2010:REPEAT:READS$:PROCreadto(S$)
:UNTILP%>&B20:CALL&900
 3330 PROChead:G$=CHR$130:PRINT''G$"Your
 task is to clear the Dune Worlds"'G$SPC
5"of the Krotan droids before"'G$SPC5"co
lonisation can take place"'
 3340 PRINT'TAB(8)"Use the following key
s:"':PROCp("CTRL","Thrust left"):PROCp("
A","Thrust right"):PROCp("*","Climb"):PR
OCp("?","Decend"):PROCp("SPACE","Fire"):
PROCp("TAB","Smart bomb"):PROCp("H","Hyp
erdrive")
 3350 PRINTTAB(5,22)CHR$136"PLEASE WAIT
A LITTLE LONGER"
 3360 PROCcode:T%=PAGE+1:A$=STRING$(255,
"*"):REPEAT:T%=T%+LEN$T%+1
 3370 IF?T%=255CLS:PRINTTAB(0,10)"LINE 1
760 IS MISSING OR INCORRECT"CHR$7:END
 3380 A$=$(T%+3):REPEAT:IFLEFT$(A$,1)="
"A$=RIGHT$(A$,LEN(A$)-1)
 3390 UNTILLEFT$(A$,1)<>" "
 3400 UNTILLEFT$(A$,6)="THEEND"
 3410 SOUND0,1,6,10:REPEAT
 3420 PRINTTAB(4,22)CHR$(RND(7)+128)"PRE
SS SPACE WHEN YOU ARE READY"
 3430 UNTILINKEY-99:*FX13
 3440 ?T%=&FF:*FX3,2
 3450 *FX15
 3460 *FX138,0,203
 3470 *FX138,0,13
 3480 *FX138,0,249
 3490 *FX138,0,13
 3500 END
 3510 DEFPROCrelocate
 3520 PROChead:IFPAGE=&1900 PRINTTAB(0,1
0)"THIS DELAY WILL BE AS SHORT AS POSSIB
LE":ENDPROC
 3530 *FX138,0,128
 3540 PRINTTAB(0,10)"PLEASE WAIT WHILST
I RELOCATE TO &1900"'':*FX3,2
 3550 IFPAGE<&1900:*KEY0FORT%=TOP-PAGE T
0-4STEP-4:T%!&1900=T%!PAGE:N.:PAGE=&1900
|MOLD|MRUN|M
 3560 IFPAGE>&1900:*KEY0FORT%=0TOTOP-PAG
E STEP4:T%!&1900=T%!PAGE:N.|MPAGE=&1900|
```

Get it right!

```
  10 =    0 0    610 =  E0B D   1210 = 2F29 2   1810 = F174 2   2410 = 3A55 A   3010 = E5BA A
  20 =    0 0    620 = FFB3 2   1220 = E5C6 C   1820 = 52AD 4   2420 =  720 3   3020 = A7E8 5
  30 =    0 0    630 = 228A E   1230 =   F1 C   1830 = DC0F 2   2430 = D7EB D   3030 = 2D65 4
  40 =    0 0    640 = ED0F C   1240 = E6B4 7   1840 = 9C02 B   2440 = E146 C   3040 = 6940 6
  50 = 71CE E    650 = 47A3 A   1250 = B33D 6   1850 = DE17 5   2450 = EEFF D   3050 = 50C3 5
  60 = ED71 2    660 = A779 4   1260 = 6BB9 4   1860 = 41A3 1   2460 = 91BD D   3060 = F0CB C
  70 = 4037 D    670 = 9AEF A   1270 = 1B63 5   1870 = F725 2   2470 = 72DB 2   3070 = CF23 F
  80 = DEBB 0    680 = C11B 3   1280 = 809F 5   1880 = C04F 6   2480 = DD9C B   3080 = 55A9 A
  90 = 5C40 0    690 = F90F 8   1290 = ED99 2   1890 = E618 6   2490 = 3B51 6   3090 =  801 C
 100 = 756E 6    700 = D86F 1   1300 = ED0F B   1900 = ED0F 7   2500 = A66E 1   3100 = 9C21 A
 110 = 43CA E    710 = F49D 1   1310 = 344C 6   1910 =  404 C   2510 = B67D B   3110 = 6103 5
 120 = 49AF 9    720 = B5F6 9   1320 = F1FB 3   1920 = 7277 2   2520 = 9B68 1   3120 = C2C7 8
 130 = 8B67 F    730 = 3AC1 5   1330 = B3E8 7   1930 = 8456 8   2530 =  315 4   3130 = D661 8
 140 = A31C 8    740 = 1F34 9   1340 = 6519 9   1940 = 1DE2 E   2540 = 358D 4   3140 = 36BB F
 150 = CEC9 0    750 = D5D4 1   1350 = ED0F 4   1950 = ED0F 4   2550 = CAE7 2   3150 = D2D6 D
 160 = 3362 2    760 = 42E7 C   1360 = 859F 2   1960 = 9C56 8   2560 = 6E08 E   3160 =  ED3 E
 170 = A3D0 9    770 = 227A 8   1370 = E46E 9   1970 = FCE4 9   2570 = 7A4A 9   3170 = C41C 9
 180 = 2011 3    780 = ED0F F   1380 = 2499 5   1980 = 683B 2   2580 = 9448 B   3180 = 2F9E A
 190 = C7A3 F    790 = 65A0 4   1390 = FE50 A   1990 = 62DD C   2590 = 268E C   3190 = 1347 4
 200 = CA5A 5    800 = D632 F   1400 = A4CD 5   2000 =    0 C   2600 = CB74 1   3200 = CDF5 1
 210 = B7F7 4    810 = E846 E   1410 = DD99 3   2010 = 6769 9   2610 = 1374 6   3210 = 892F 8
 220 = 944F 0    820 = ED0F 5   1420 = 4AF2 9   2020 = B17A B   2620 = 79AE A   3220 = CF00 D
 230 = 2055 5    830 = 5CE9 3   1430 = A825 D   2030 = B83D 5   2630 = CB85 F   3230 = A473 E
 240 = E014 2    840 = B2BB 3   1440 = DEF2 E   2040 = D385 D   2640 = 9535 9   3240 = ED0F 4
 250 = DEEB 8    850 = 3A84 C   1450 =  F23 7   2050 = DA19 8   2650 =  8A1 6   3250 = 8F73 C
 260 = 7C21 A    860 = A9AA 6   1460 = C0E4 8   2060 = AAEF B   2660 =  B6F 1   3260 = CD93 B
 270 = CCB1 2    870 = E810 D   1470 = 4382 D   2070 = 4500 F   2670 = 3399 2   3270 = 217A 3
 280 = 75DF 2    880 = BA67 5   1480 = A9CB D   2080 = CC97 9   2680 = F51D 4   3280 = 6F38 4
 290 = 577F C    890 = ED0F 8   1490 = ED0F 5   2090 = 62BA E   2690 = FCBA B   3290 = 828F B
 300 = ED0F D    900 = FB0B A   1500 = D9FC C   2100 = 4539 5   2700 =  A9D 9   3300 = F272 E
 310 = 6969 D    910 = A812 9   1510 = 2B05 5   2110 = 3AE9 5   2710 = BB31 C   3310 =  4C1 5
 320 = 235B B    920 = 4B21 F   1520 = ED0F 6   2120 = 16DD 7   2720 = 2528 8   3320 = 2A11 C
 330 = 588C D    930 = 9114 E   1530 = 8B1F A   2130 = 4805 2   2730 = 38CC 3   3330 = 5A21 C
 340 = C04D 7    940 = 4B5A D   1540 = 2EDB 7   2140 = 945F 5   2740 = B9FE B   3340 = 41E8 3
 350 = 1AAA 4    950 = 73C8 4   1550 = 6F36 B   2150 = 5C96 B   2750 = C0D3 B   3350 = BE62 8
 360 = 614F D    960 = DBD8 B   1560 = ED0F 2   2160 = 18AA D   2760 = E0C5 C   3360 = C779 C
 370 = 16AF 1    970 = E035 C   1570 = 34BC 4   2170 = 5603 D   2770 =  6B1 B   3370 = EBAC 0
 380 = D643 4    980 = C5B1 C   1580 =  395 F   2180 = F47D 6   2780 = A6EE 8   3380 = 64B2 D
 390 = 1BE3 6    990 = 6BEF 5   1590 = FE72 B   2190 = 45C7 A   2790 = 8854 2   3390 = C5E4 0
 400 = ED0F 0   1000 = B355 5   1600 = C12B F   2200 =   8E 2   2800 = 9273 C   3400 = 85C6 B
 410 = 4981 B   1010 = 19DF 8   1610 = D089 4   2210 = 4B05 6   2810 = FE07 5   3410 = A00E 5
 420 = B519 B   1020 = E849 9   1620 = ED0F 3   2220 =  9D9 7   2820 = 17F2 7   3420 = 9FA5 9
 430 = 61AE B   1030 =  638 7   1630 = D936 E   2230 = 5DD5 D   2830 = FD55 7   3430 = 4A0F 5
 440 = F2F8 B   1040 = 776E B   1640 = EE80 4   2240 = BBCB 7   2840 = 11E5 A   3440 = F811 2
 450 = ED0F C   1050 = 2661 5   1650 = CEAD 8   2250 = 65B4 C   2850 = 5B01 1   3450 = A022 0
 460 = 4623 1   1060 = 3292 4   1660 = 439D 8   2260 = 1C31 0   2860 = F0D6 D   3460 = D3B5 4
 470 = CBA2 5   1070 = A3EC F   1670 = AFFB F   2270 =    0 0   2870 = D515 A   3470 = 42B1 A
 480 = 61F6 8   1080 = BC77 D   1680 = 19A6 B   2280 = EE56 E   2880 = 9EC7 7   3480 = BE3B E
 490 = 7B24 4   1090 = D9E2 4   1690 = CB50 1   2290 = BFCE F   2890 = 1D68 A   3490 = 42B1 E
 500 = 3BF7 C   1100 = 5B31 6   1700 = E014 4   2300 = ABE7 D   2900 = C1AE 8   3500 = FD2E 9
 510 = F64E 6   1110 = 67B2 0   1710 = ED0F D   2310 = EF1F A   2910 = E39D F   3510 = 138F B
 520 = 992D A   1120 = ED0F 9   1720 = 4759 1   2320 =  629 7   2920 = 75FD 1   3520 = CBA1 F
 530 = 1B47 C   1130 = C430 E   1730 = 78B9 D   2330 =  F54 3   2930 = 8C89 B   3530 = 5DEC 4
 540 = ED0F 9   1140 = D53C F   1740 = 7998 5   2340 = 7D96 D   2940 = C2F3 4   3540 = 7BCF A
 550 = AF64 8   1150 = 823F B   1750 = ED0F 5   2350 = 6C31 6   2950 = 2F73 F   3550 = 3CED 7
 560 = 3F71 3   1160 = BB68 C   1760 = 4492 8   2360 = 70D8 A   2960 = C9CD 9   3560 = FB79 9
 570 = ED0F 4   1170 = 8F39 7   1770 = 6777 B   2370 = A6D0 9   2970 = 7870 6
 580 = 3E78 5   1180 = A7A1 7   1780 = 1F9B 1   2380 = D74E 7   2980 = 5464 8
 590 = A022 4   1190 = A2A1 3   1790 = 1AF2 E   2390 = B395 0   2990 = 2A87 A
 600 = 3326 E   1200 = B58E 5   1800 = AF63 C   2400 = 47C1 C   3000 = 720C A
```

This listing is included in this month's tape & disc offer. See order form on Page 149.

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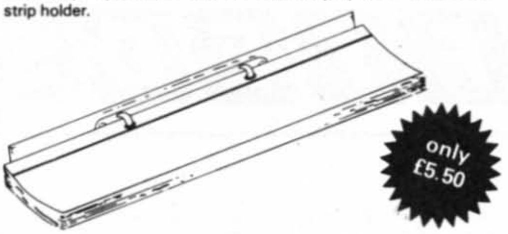

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	10 for £1.25
Function strip design software	**£4.50**

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VISA

LETTERS

£10 Prize letter

Single key file saving

ONE feature of mainframe computers that is easily duplicated on a BBC Micro is the single key way of saving files using successive generation numbers. This can easily be achieved if you define a function key as follows:

```
*KEY 0 M%=?(PAGE+3)-2|M V%
=VAL(CHR$(M%?PAGE))*10+VAL
(CHR$(M%?(PAGE+1)))+1|M M%
?(PAGE+1=ASC(STR$(V% MOD 1
0))|M M%?PAGE=ASC(STR$(V%
DIV 10))|M SAVE $(PAGE+5)|M
```

Put the program name in the first line of the program in a REM statement. This can also include drive and directory specifications so it takes the form:

```
10REM : DRIVE, DIRECTORY, NAME
```

Under the DFS the filename can be up to seven characters and you must make the last two numeric for the method to work.

Valid first lines are:

```
10REM :1.$.PROG01
10REM A.PNAME22
10REM P11
```

Under the ADFS, program names can be up to 10 characters and again you must make the last characters numeric giving first lines like:

```
10REM:0.$.PROGRAMS.GAMES. TE
STIPROG00
10REM MYPROG23
```

Now when the function key is pressed it adds 1 to the number contained in the last two characters of the first line – it is important not to have any spaces after the numeric characters – and saves the program by passing the string after the REM token to the operating system.

This system allows generation numbers of 00 to 99 but by changing the parameters in the function key definition other ranges could be used, especially under ADFS with its 10 character filenames.

A further refinement is to lock the file once it has been saved to prevent accidental erasure or corruption. If you have Basic II or above this is accomplished by adding one of the following lines to the end of the function key definition.

For DFS:

```
OSCLI"ACCESS "+$(PAGE+5)+
" L"|M
```

For ADFS:

```
OSCLI"ACCESS "+$(PAGE+5)+
" WRL"|M
```

The easiest method of using this system is to create a development disc and set the function key definition up in the boot file and EXEC it, but it can be put in a utility program or entered direct. – **Judith Ann Lucas, Gateshead.**

Considering a Master

I AM considering changing my Model B to BBC Master 128. Could readers of The Micro User *give me their opinion whether they think this is a worthwhile upgrade.*

I have accumulated a lot of software on disc and files including ones from View and Wordwise. Would I still be able to use these on a Master? – **R. Gray, Norwich.**

● You would be able to use your View and Wordwise files on a Master but some software would not work. If any readers send their opinions we'll publish them in a future issue of *The Micro User.*

Paltry packages

THE requirement nowadays is for games to be addictive, value for money and cheap. But the only way some companies seem to achieve this is by cheapening the cassette package itself.

I have lost count of the number of times that tapes only load properly on the first run. From then on, it is Rewind tape, Data? and garbled loading information.

The reason is possibly twofold, the tape is of poor quality and therefore stretches or the cassette is badly designed and slows the running of the tape.

Both faults produce slurred signal reproduction to the computer. Either a great deal of patience or rehousing of the tape to a proven cassette are the answer. – **Tony Manning, Wirral, Merseyside.**

● Actually there is a much more likely reason for your one-run tapes. The head of your tape player has become magnetised (as they all do eventually) and is corrupting the tape as it winds through.

All you need to do is borrow or buy a de-magnetizer and use it on your tape head. Also make sure your tape is playing back at the correct volume.

Unassembling assembler

I HAVE been having some difficulty with Nigel Reed's short assembly language program published on page 155 of the December 1986 issue of The Micro User.

When I run the program on my Master 128, it won't assemble the machine code beyond line 460. I know nothing about assembly language. So what's wrong? Can you help? – **D. Stewart, East Finchley, London.**

● The PAGE setting (where your Basic program is put) for the Master is at &E00 and the machine code in this program is assembled at &1200.

This means that the code is overwriting your variables or your program.

Change lines 80 and 500 as follows:

```
80 P%= &C00
500 ?&20F=&C
```

Win a tenner

● Want to write to The Micro User? The address is: Letters, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Writers of the most interesting letters receive a £10 prize.

Activating Imogen

If you have an Opus Challenger here's how to get Imogen working. Insert the disc into drive 0 and type in the following:

```
*FORMAT
4
0
F
*COPY 0 4*.*
*DRIVE 4
*TITLE "IMOGEN"
*OPT 4,2
*LOAD !BOOT
?&1237=1
*SAVE !BOOT 1234 +934
*LOAD G
?&3CC3=1
*SAVE G 1234+2FF2 3C06
*CONFIG 4=0 0=4
```

Now press Control+Break, followed by Shift+Break to load the program.

*The reason that this works is that Imogen performs *OPT 0,0 in files !BOOT and G. Challenger will not accept this and produces a Bad Option error. The changes set Imogen to run on ram disc 4, and alter all the *OPT 0,0s to *OPT 1,0s.*

Now, can anyone help me? I'd like to know if there is an OS location or a small routine to tell me where the raster is on-screen at any given time. I need to know this to prevent sprite flicker. – **Ian Grimstead, Downend, Bristol.**

● You shouldn't need to know

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LETTERS

◀ **From Page 143**

where the raster is to prevent flicker. There was a series of articles about writing games in *The Micro User* from January to May.

It was written by Roland Waddilove and in it he covered several techniques, including how to produce flicker-free sprites.

Star commands from Basic

I OWN a BBC Micro 32k with 1.2 OS Basic I, Acorn 1.2 DFS and Cumana 40 track disc drive and would like to know how to give disc commands from within a Basic program by typing the filename, drive and any other necessary data.

I would also like to know if upgrading to 64k would stop certain programs working. – **Matthew Allen, Bury St. Edmunds, Suffolk.**

● All star commands can be issued from Basic like this:

```
10 *ACCESS FRED L
```

but you cannot use variables like *file$*. Basic II provides a command, OSCLI, which allows you to create a string using variables and have that executed as a star command:

```
   10 file$="FRED"
   20 OSCLI "ACCESS "+file
$+" L"
```

But for Basic I we need to create a procedure to do this for us:

```
   10 file$="FRED"
   20 PROCoscli("ACCESS "+
file$+" L")
   30 END
 1000 DEF PROCoscli($&700)
 1010 LOCAL X%,Y%:Y%=7
 1020 CALL &FFF7:ENDPROC
```

In answer to your other question, adding sideways ram (in 16k blocks) to your Model B would casue no problems with most boards. However some shadow screen boards do cause problems and some software fails to run on a B+ or B+128.

Impressive graphics

I HAVE witnessed the graphics demo of the Archimedes on display at Watford Electronics and I am impressed. The speed of the machine when handling very high resolution, multicoloured graphics is incredible.

The most impressive bit for me is the machine code. I have a book on the assembler, which is far simpler in concept than any micro I've yet written code for.

Although there are very few operations, the way an op-code can be specified allows incredible scope for imagination – at frightening speeds.

The processor is able to run at 14 mips (million instructions per second), but the Archimedes can only chug along at around 4 mips when accessing rom and 8 mips on ram or internal registers because it is slowed down by the memory itself.

The actual instructions are so powerful though:

```
ADDNES R0,R1,R2,LSL #2
```

This equates to: If (zero flag is clear) THEN (R0 = (R2 times 4) + R1) (Flags set on result, carry ignored for calculation). Note: R0, R1 and R2 are 32 bit registers, NE is not equal condition, S means set flags on result.

```
ADCAL R0,R0,R0,LSL #1
```

which means: R0 = 3 x R0 + carry.

Note: AL meaning always, ADC add with carry, no S means flags remain unchanged. LSL#1 shifts the second operand left by one bit (multiply by two) before addition.

So the instructions are all conditional, which makes a lot of conditional branches redundant. The operation only affects flags if specifically required to do so, and the right hand operand can be pre-barrel, shifted by 32 bits during a single instruction.

Considering all the operating system calls, the stack type memory handling instructions, the instructions seem almost as powerful as a high-level language, which probably explains the incredible speed Basic runs at.

From the meagre details I have already gleaned, I reckon Archimedes will soon become the standard by which all other micros will be measured and I wish I had one on my desk right now.

But I'll just have to wait till my 100000 pennies are in the bank. After that I suppose the queue will take me well into 1988.

Anyway, when you get yours, let me know what I'm missing, and maybe you can convince my other half that it's far more important than her new microwave and/or the caravan. – **Brian Vallot-Lewis, via MicroLink.**

£10 Prize letter

Out dammed spot...

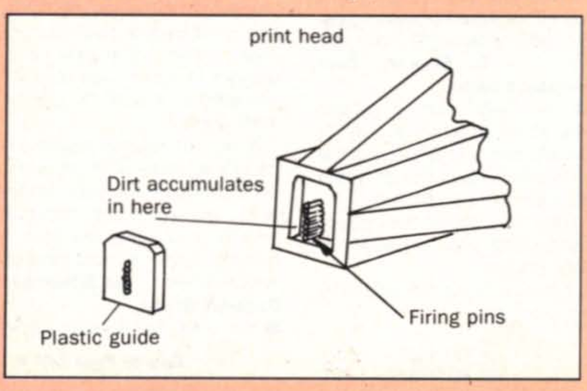
IN the September issue of The Micro User, *Andrew Smith asked for help with a problem with his printer which was leaving smudges on the paper. After many months of experiencing the same problem with my Star DP510 printer, I was considering buying a new NLQ model. After all I had had five good years from it anyway, especially with multi-toned screen dumps.*

One last look at the problem I thought. I removed the print head and a small piece of plastic fell to the ground. Inspecting it told me that it was a guide that held the nine firing pins in a vertical line and should fit into a recess on the front of the print head as can be seen in the diagram.

I tried to replace it but it wouldn't fit properly because of all the ink and ribbon debris that had accumulated behind it over the years. In fact the bottom of the guide was at least 1mm out of line and this would produce the type of rubbing pattern I was getting.

After carefully cleaning it with cotton buds and a non-acetone based spirit cleaner I re-fitted the piece of plastic without forcing it as the slot for the firing pins is very small. I had thought of a drop of superglue but caution overcame me so I replaced the head.

The fault was cured – no more ribbon rub and no more spots. – **Rod Holt, Basildon, Essex.**



Cursor correction

I'D just like to clear up one of the points raised in John Herbert's letter in your August issue:

**FX4,1 does not allow the cursor keys to be defined like the function keys, as he suggests. *FX4,2 is the correct call.*

**FX4,1 makes the cursor keys return Ascii values, allowing them to be detected using Basic's GET statement, which is useful in some situations.*

*A well-written program should always use a *FX4,0 command to reset the cursor keys when it finishes or is interrupted by Escape.*

Still on the subject of

editing, I find the slowness of the copying action annoying, especially when working with long program lines.

*A useful tip regarding this is to use *FX12,4, which decreases the auto-repeat period, effectively making this process much faster. The effect on normal typing is minimal.* – **Jonathan Temple, Nottingham.**

Using checksum program

I AM a beginner with very little knowledge of computer programming. The first issue of The Micro User *I bought was the July issue. I typed in various programs unaware how Get It Right! worked.*

Then a friend lent me the June issue of The Micro User *and to my delight found the Basic checksum program, which I typed in. It works fine.*

My problem is how do I check programs I have already typed in and saved. It works all right when I load it into memory at PAGE=&7000 but when I load anything else it wipes out all existing programs including the checksum program.

Please can you help as I have a lot of programs already on disc that need checking. – **Ian Hambelton, Surrey.**

● Before loading another program, type PAGE=&1900. Then before you run the checksum program reset PAGE to &7000. You can switch between the two programs in memory by just altering the PAGE setting, and typing OLD.

Five minute drum beat

AFTER typing in Huw Woolley's 10 minute game in the July issue of The Micro User *I decided to try and go one better and write a five minute program that fits on one line.*

This is a vaguely useful program that turns the BBC Micro into a simple drum machine, with a maximum storage capacity of 1000 beats. The keys Z and X sound the drums, and Q will replay your rhythm. Any other key will cause the program to end.

The program could be greatly enhanced, but this would make it much longer (and hence add to finger ache).

```
   10 DIMA(999),B(999):A=0:
D=0:REPEATTIME=0:G=GET:B(D)
=TIME:IFG=88SOUND0,-15,12,1
:A(D)=12:D=D+1:UNTILA=1:ELS
EIFG=90SOUND0,-15,5,1:A(D)=
5:D=D+1:UNTILA=1:ELSEIFG=81
FORZ=0TO(D-1):TIME=0:REPEAT
UNTILTIME=B(Z):SOUND0,-15,A
(Z),1:NEXT
```

– **Richard Tate, Heaton Moor, Stockport.**

Introducing garbage

I'M flattered that my contribution, Decimal Revealed, in the August issue of The Micro User *is regarded as being prizeworthy, but may I draw your attention to two small omissions that crept in to the letter as printed.*

Preferably, the VDU 1 command (send to printer only) should precede the final parameters of both the reverse paper and margin commands. Unfortunately in lines 34 and 35 they were omitted.

The micro will therefore regard those parameters as mere Ascii characters and print them to screen as garbage.

Moreover, my MT85 printer does not always recognise the final parameter as part of the printer command unless that VDU 1 is present – a garbled printout may result.

To avoid such problems, readers should amend line 34 to read:

```
FOR A=1 TO 6:VDU 1,27,1,10
6,1,252:NEXT:VDU 1,27,1,10
8,1,48
```

– **John Henson, Dundonald, Kilmarnock.**

Centring text

WHEN programming I found that placing text on a line took me quite a while before it was in the perfect place.

Here is a short procedure to centre your text on a line if you enter the message, the vertical tab and the mode. Lines 10 to 100 are a demonstration routine to show that the procedure following them works.

```
   10 REM Centre Text
   20 REM By S. Hill
   30 FORmo%=0TO7
   40 MODEmo%:VDU23,1,0;0;0
;0;
   50 PROCct("Centred",3,mo
%)
   60 PROCct("Text",5,mo%)
   70 FORdel%=0TO4000:NEXT
   80 NEXT
   90 END
  100 :
  110 DEFPROCct(str$,vtab%,
mode%)
  120 LOCALa%,b%,c%
  130 IFmode%=0 OR mode%=3
a%=39
  140 IFmode%=1 OR mode%=4
OR mode%=6 OR mode%=7 a%=19
  150 IFmode%=2 OR mode%=5
a%=9
  160 b%=LENstr$/2:c%=a%-b%
  170 PRINTTAB(c%,vtab%);st
r$
  180 ENDPROC
```

Also, lines 1750 and 1760 of Soccer Manager in the September issue of The Micro User *are wrong because you can't enter player number 50 in a match. If the 50s in the lines are changed to 51s the program works perfectly.* – **Saul Hill, Sale Moor, Cheshire.**

Multiple variables

£10 Prize letter

I HAVE been using John Kelk's excellent Variable Compressor since it was published in the February issue of The Micro User. *It recently occurred to me that it produces many variables beginning with the same letter – contrary to the advice given on page 194 of the User Guide.*

The naming sequence a to z; aa to az; ba to bz and so on. For example, in a program with 70 variables, 27 will begin with a (a and aa to az), 19 with b (b and ba to br) and one each with c to z.

Altering the lines shown changes the name sequence to a to z; aa to za; ab to zb and so on. Now a 70 variable program would have them distributed so that only three begin with each of the letters a to r and two each from s to z.

```
   2092 LDY ynew
   2094 TXA
   2096 STA (base2),Y
   2098 INY
   2110 :
   2150 :
   2160 :
   2170 STY ynew
   2200 STX pfirst+1
   2242 .pfirst
   2244 LDA £0:JSR oswrch
   2280 .single
   2290 :
   4560 DATA as line,10020
```

– **M. J. Newsome, Worthing, West Sussex.**

Wrong number

IN THE July issue of The Micro User *magazine you printed an article in the news section on Chestnut Software and its products. The telephone number contained in the article was unfortunately incorrect. The correct number is 01-303 2981.* – **Colin Chappell, Chestnut Software, Bexleyheath, Kent.**

Star commands with Master 128

IN THE November 1986 issue of The Micro User *there is a utility for creating star commands to use with a printer. This program would be extremely useful for me but I can't seem to make it work.*

*I entered the program as printed, I got all the correct responses and *SAVEed a file as called for. But when I try the test program the only response I get is BAD COMMAND at line 10.*

I have a Master 128 with Turbo co-processor and an MP165 printer. Have you any

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LETTERS

◀ *From Page 145*

suggestions what could be going wrong? – **C.M. Williams, Essex.**

● If you have saved the code using the addresses given it will re-load into the co-processor and not work. To ensure it loads back into the host machine, just precede the addresses given with FFFF as you save it (for example FFFF0900).

No Language

I AM currently engaged in trying to make my BBC Micro enter the No Language Environment (NLE). I know that this is possible with 6502 2nd Processor, with the BBC Master Range, and even with the Archimedes 300 series.

I have scoured the Operating System and have found very little, except the Language? error. This is available by calling locations around and including &DBD0.

On my travels I have also discovered the error key in use. How can I generate this error, as the function keys are not write protected? – **Ben Byram-Wigfield, Brimfield Common, Nr. Ludlow.**

● The Model B and B+ cannot enter the No Language Environment and in the event of no language being in the machine they generate the Language? error and hang up.

The Key in use error can be generated like this:

```
*KEY0*KEY0HELLO||M-
|MHELLO|M
```

then press f0.

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

Scrolling problem

I HAVE every issue of The Micro User *and I enjoy the problem and letter pages most. Unfortunately, I now have a problem of my own.*

The program shown runs correctly until period 20, then the format breaks up with numbers carrying on different lines. Can you please explain why?

```
   500 DIM Y(53),date$(53)
   510 CLS
   520 PRINT'"Now enter yo
ur data"'
   530 PRINTSPC(2);"Period
";SPC(8);"Value";SPC(12);"
Date"
   540 FOR T=1 TO 53
   550 IF T<10 PRINT" ";
   560 PRINTTAB(4,T+4);T:I
NPUT TAB(15,T+4)Y(T):INPUT
 TAB(31,T+4)date$(T)
   570 NEXT
```

– A. Seddon, Merseyside.

●The problem is that at period 20 the program reaches the bottom of the screen and this then starts to scroll.

Copy Protection

HOW can I protect my programs from being LOADed into the computer and LISTed. – **Adam Smith, Boylestone, Derbyshire.**

● If we were to explain how to do this, then anyone reading the magazine could work backwards and discover how to un-protect it.

There was a disc protection system described in the April 1987 issue of *The Micro User* and you could use that to safeguard your programs.

Random error

IS there a mistake in the Random Number Generator listing on page 55 of the September issue of The Micro User?

Having typed in the listing and corrected some errors, I finished up with and error out Line 700 – No such variable. It was fairly obvious that something is missing after P%=P%+LEN. So I added LEN(E$), but to no avail.

Altering Line 190 to produce a listing of PROCassem shows that assembly does not continue after line 650. Can you please explain why? – **W.E. Gander, Henfield, West Sussex.**

● There is an error – the end of line 700 has been omitted: It should read:

```
   700 P%=P%+LEN(E$):=L%
```

The 1010 Commandments

0001 *Thy written invocation shall contain no more than two GOTOs: One shalt be for ONERRORGOTO who saves our dignity and the second shall be for the return from ONERRORGOTO.*

0010 *Blessed be the Proc of the Basic of the Beeb and banish Gosub from thy sight lest thee spend many an accursed hour battling the minor demons and bugs that will infest thine invocation.*

0011 *The naming of thine Vars and Procs and Funs shall be meaningful and in little letters so that at the Day of Judgement thy creation shall be readable.*

0100 *Remember that the Keyboard Master is wild and unruly and without thought and his buffers must be cleared often and wisely.*

For thee, Writer of Machine Invocations

0101 *Useth thee only the spells of Mighty Acron that have been documented. For if thou turnest away from these when the Mighty Acron blesses thee with a new machine thine invocation shall up-hang.*

0110 *When thou changest vectors thou do so at thine own peril. Be wary and set all the wards and store thee an ancient copy of it and jump thou to it as in a chain of daisies else the Great Machine will come upon thee and crash.*

0111 *Assemblest thy code twice in succession, placing it in some peaceful eddy where it is not afflicted by the changing values of the memory currents.*

1000 *Save the incantation of thy spell on a disek, tapet or scroll so that if thy spell turns madly and devours itself thou wilt be empowered to resurrect it in whole.*

To become a true follower of Acron

1001 *Thou must program, debug and learn about thy machine all the while and resist thee the aweful temptations of the demon Games. For these will steal away thy hours and leave thee in bewilderment and frustration and thou shalt learn nought save when to smart-bomb the enemy.*

1010 *And in ultimo, thee must do but two things: Primus, uphold above all others the 6502 and her sisters, but speak quietly of 65C816 who has turned from the path of simplicity and clarity, and upon a pedestal place the Acron Risc.*

You must shun the devils Z80, 8086 (and his brother 8088) also those devils incarnate of complexity ni plus ultra 80386 and 68020. Secundus, save thy groats and shekels so that thee may take out a subscription to the oracle of all the followers of Acron: the great prophet The Micro User.

Scribed by Lawrence Angrave of the Shire of Buckingham.

Learning CAN be fun

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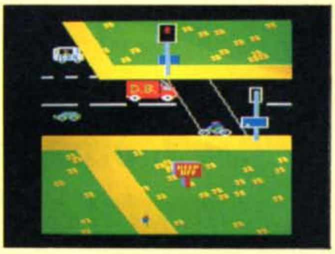
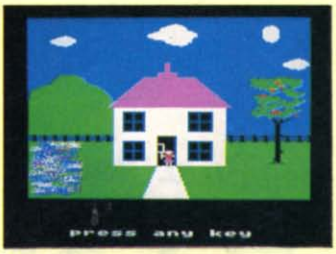
Hilo
Maths Test
Mouser
Number Signs
Seawall
Super Spell

Ages 8-12

Anagram
Codebreaker
Dog Duck Corn
Guessing
Hangman
Maths Hike
Nim
Odd Man Out
Pelmanism
Towers of Hanoi

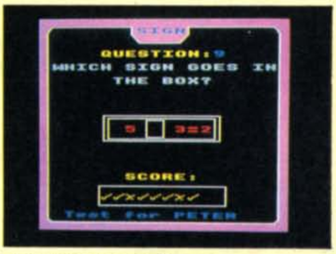


PELICAN
Teach your children to cross the road safely at a Pelican crossing



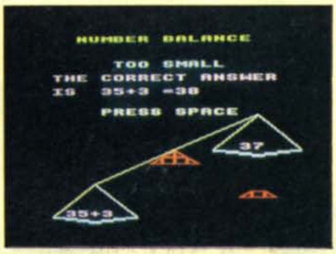
```
press any key
```

HOUSE
Select the colours to draw a house – hours of creative entertainment



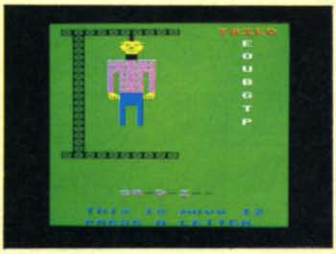
```
SIGN
QUESTION:9
WHICH SIGN GOES IN
THE BOX?
5 [ ] 3=2
SCORE:
✓✓✗✓✓✓✗✓
Test for PETER
```

NUMBER SIGNS
Provide the correct arithmetic sign and aim to score ten out of ten



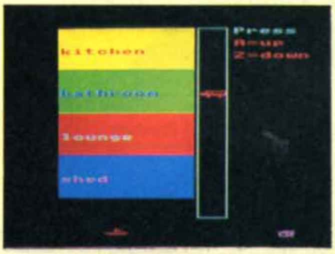
```
NUMBER BALANCE
TOO SMALL
THE CORRECT ANSWER
IS  35+3 =38
PRESS SPACE
37
35+3
```

BALANCE
Learn maths the fun way. Type in the answer to balance the scales



```
TRIED
E
O
U
B
G
T
P
this is move 12
press a letter
```

HANGMAN
Improve your child's spelling with this fun version of the popular game



```
kitchen
bathroom
lounge
shed
Press
A=up
Z=down
```

ODD MAN OUT
Find the word that does not fit – before your time runs out

TO ORDER TURN TO THE FORM ON PAGE 149

Drive into a new dimension!

Grand Prix Construction Set from Superior Software is an all-action racing game with a difference.

Using the built-in editor you can design your own circuits by choosing from a range of bends, chicanes, hump-backed bridges and more.

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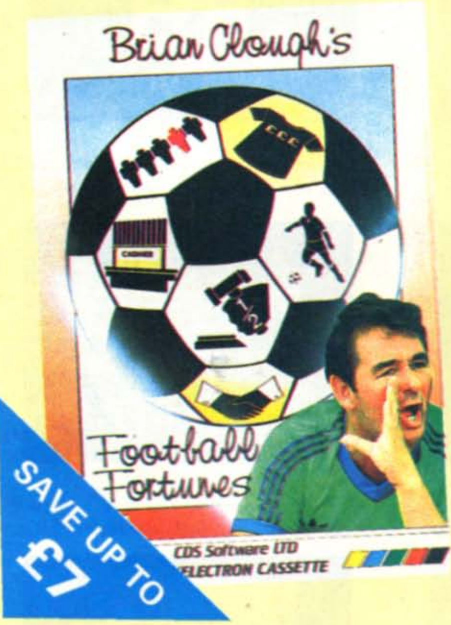

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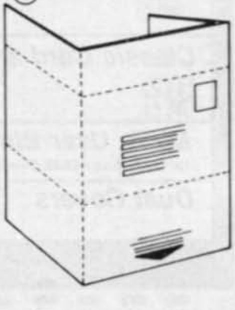

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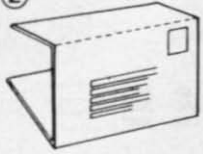

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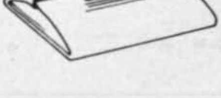

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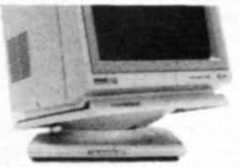

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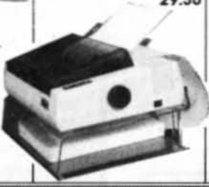

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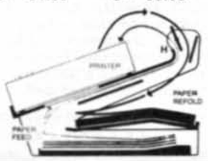

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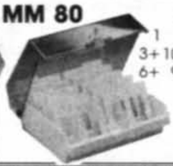

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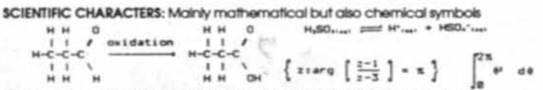

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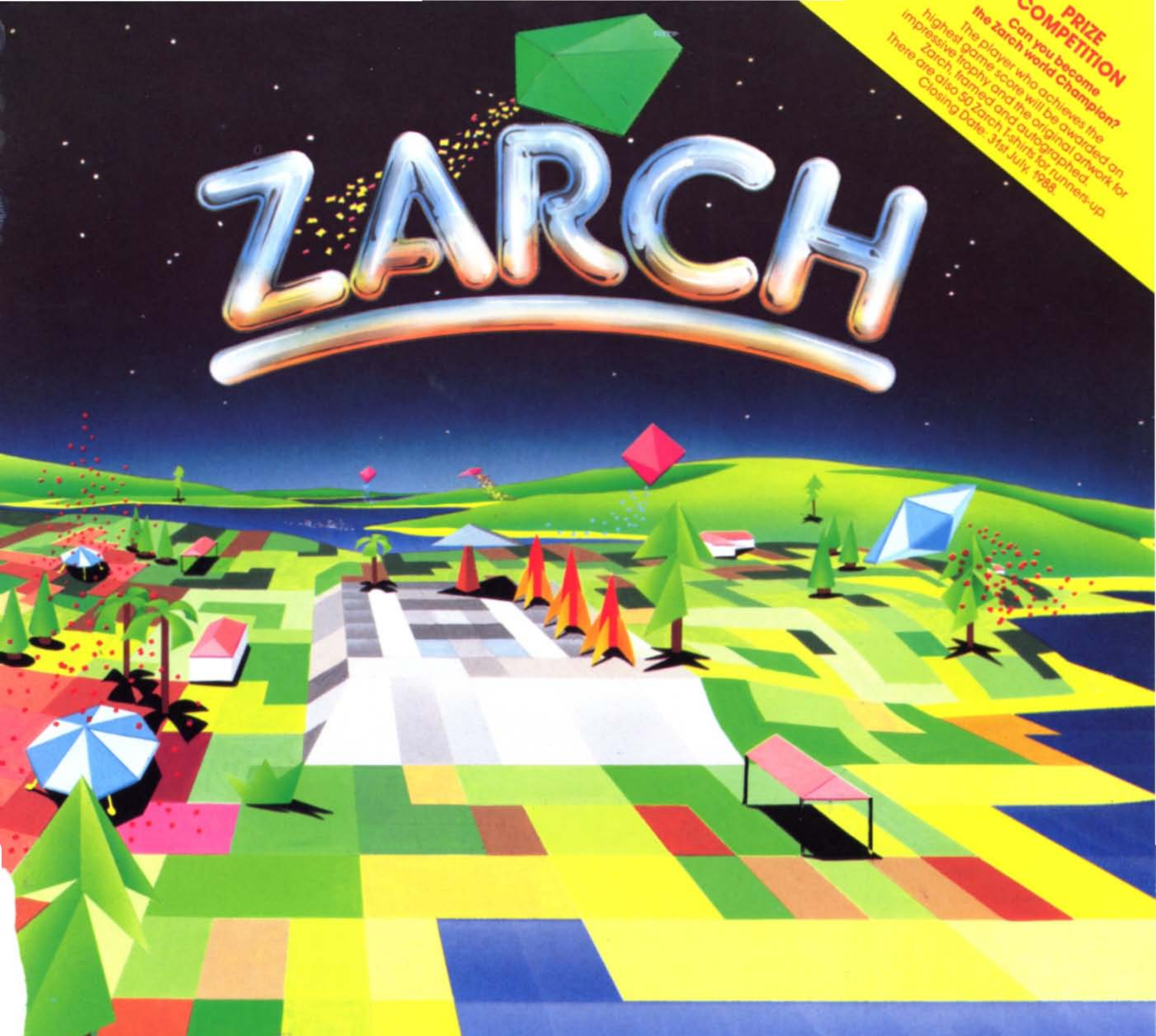

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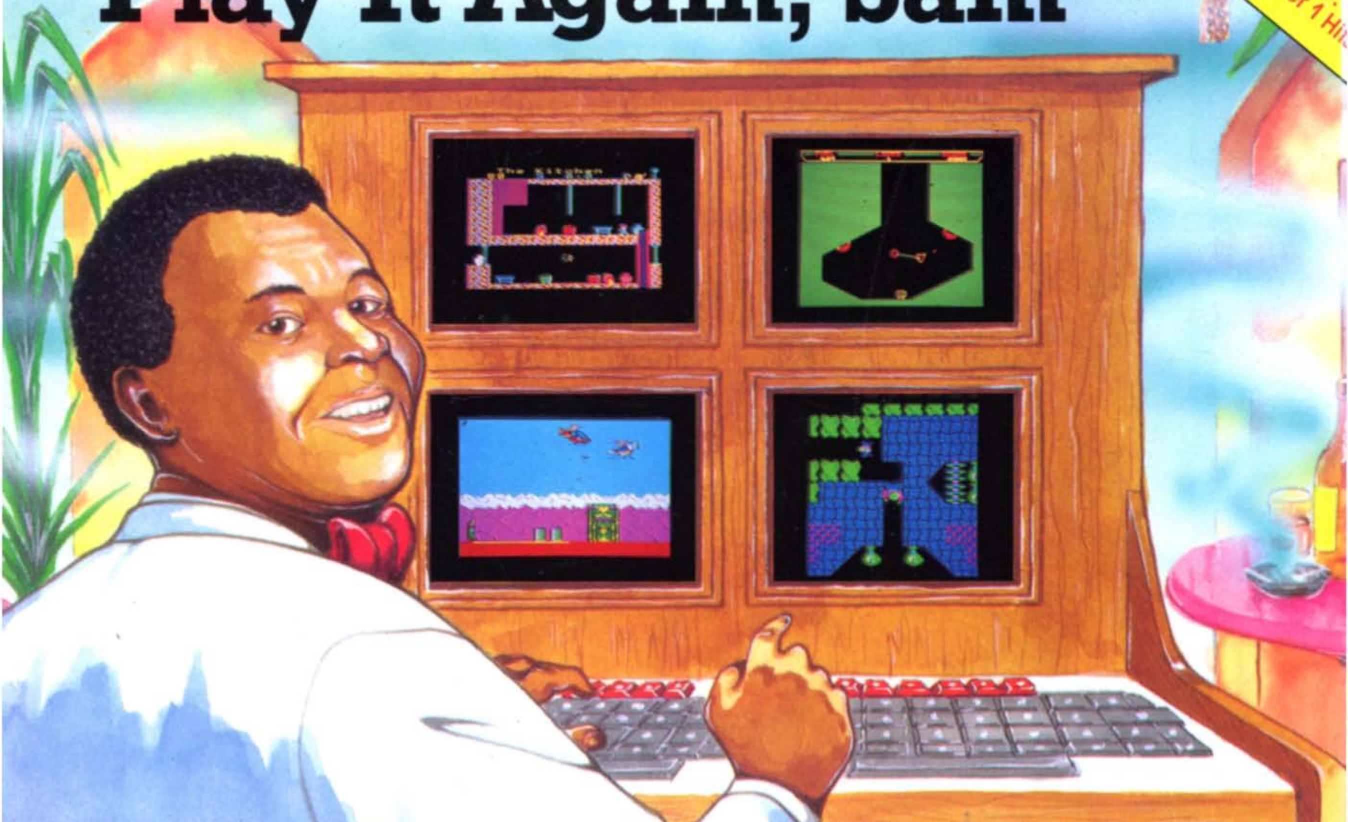

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